Syllabus of F.Y. M.C.A. (Science) Course

Academic Year 2013-14

Syllabus for M.C.A. (Under Science Faculty) in affiliated colleges to University of Pune

(To be implemented from Academic year 2013-2014)

Credit Based System

- **Course Structure –**

Duration: The entire Programme is a Three year and Six semester full time Programme.
No. of Courses: For first five semesters there will be Six courses. The last semester will be Industrial training/Institutional project and two theory courses.

- **Salient Features –**

1. Each Theory course will be of 4 credits and each Lab. Course (Practical) of 5 credits.
2. Each semester is of 6 courses and 25 credits (This is not applicable for Industrial training in VI semester of M.C.A.).
3. Each regular student will have to appear for all the 25 credits of the respective semester.
4. Student who wishes to take admission to the second year M.C.A should have obtained at least 25 credits out of 50 credits of the First year M.C.A.
5. A student will have to complete at least 75% credits (other than for IT – SemVI) from M.C.A. (Under Science Faculty) syllabus. The remaining 25% credits (other than for IT–SemVI) can be chosen from the courses offered by the other Departments/subjects (other than Computer Science courses) with credits system structure.

- **Evaluation Rules –**

Pattern of Examination

Evaluation of Students:

1) The In-semester and End-Semester examinations will be of 50 marks each.
2) Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.
3) A student cannot register for third semester/fourth semester if s/he fails to complete the minimum of 50% credits of the total credits of two semesters of the first year.
4) Internal marks will not change. Student cannot repeat internal assessment. If student misses internal assessment examination, s/he will have second chance with the permission of the concerned teacher. But it will not be right of the student. It will be the discretion of the concerned teacher and internal departmental assessment committee.
5) There shall be revaluation of answer script of end semester examination, but not of internal assessment papers.

6) Internal assessment (IA) answer scripts may be shown to the concerned student but not end semester answer script.

Internal Assessment (Continuous Assessment): Internal assessment for each course would be continuous and dates for each tutorials/practical tests will be pre-notified in the time table for teaching or placed separately as a part of time table. Department / College Internal Assessment Committee will coordinate this activity

Theory Courses: Conducting written tests should not be encouraged. More focus should be on non-written tests. Students should be encouraged to conduct various academic activities. A teacher must select a variety of the procedures for internal assessment suggested as follows.

a) Mid-term test
b) On-line test
c) Open book test (concerned teacher will decide the allowed books)
d) Tutorial
e) Surprise test
f) Oral
g) Theory Assignments
h) Review of Research paper
i) Seminar presentation
j) Journal/Lecture/Library notes
k) Group Discussion
l) Programming Assignments

Student has to preserve the documentation of the internal assessment except midterm test answer script. It is the responsibility of the student to preserve the documents.

Project Courses : The Project can be platform, Language and technology independent. Project will be evaluated by project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation.

University Examination (UE): End-Semester examination for 50 marks per course would be held as per the scheduled given by University of Pune.

1. If a student fails in a course of any semester then the student can appear only for the End of Semester Examination of the following semester. However he/she can improve the Internal Assessment (continuous assessment) performance in any of the forthcoming semesters in which the course is subsequently conducted and in this case, the student will have to appear for End of Semester Examination also for the said course.
2. The assessment of 17 credits towards VI th semester (Full Time Industrial Training / Institutional project) will be carried out as follows:
   i. A student will inform the department about the joining date of the above mentioned training.

ii. The student will have to make minimum two presentations, one in the third month and the other at the end of the training programme. These presentations will be considered towards CA.
iii. The student will have to submit a Dissertation/Report to the department which will be assessed towards course credits.

Award of Class

Grades will be awarded from grade point average (GPA) of the credits.

GPA Rules:

1. The formula for GPA will be based on Weighted Average. The final GPA will not be printed unless a student passes courses equivalent to minimum 150 credit hours (Science). Total credits hours means the sum of credit hours of the courses which a student has passed.
2. A seven point grade system [guided by the Government of Maharashtra Resolution No. NGO – 1298 / [4619] / UNI 4 dt. December 11, 1999 and University regulations] will be followed. The corresponding grade table is attached herewith.
3. If the GPA is higher than the indicated upper limit in the third decimal digit then the student be awarded higher final grade (e.g. a student getting GPA of 4.492 may be awarded 'A')
4. For Semester I, II, III examinations, only the grade points will be awarded for each subject. Final GPA along with final grade will be awarded only at the end of IV semester. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.
5. After the declaration of result, for the improvement of Grade, the student can reappear for the examination of minimum 30 credits worth theory courses.

Grade and Grade Point Average		
Marks	Obtained Grade	Grade Points
100 – 75	'O' Outstanding	06
74 – 65	'A' Very Good	05
64 – 55	'B' Good	04
54 – 50	'C' Average	03
49 – 45	'D' Satisfactory	02
44 – 40	'E' Pass	01
39 and less	'F' Fail	00

Final Grade Points	
Grade Points	Final Grade
5.00 – 6.00	O
4.50 – 4.99	A
3.50 – 4.49	B
2.50 – 3.49	C
1.50 – 2.49	D
0.50 – 1.49	E
0.00 – 0.49	F

Common Formula for Grade Point Average (GPA):

$$GPA = \frac{\text{Total of Grade Points earned} \times \text{Credit hours for each course}}{\text{Total Credit hours}}$$

B Grade is equivalent to at least 55% of the marks

External Students: There shall be no external students.

Setting of Question Paper / Pattern of Question Paper

For core (compulsory) theory courses end semester question papers set by the University of Pune and centralized assessment for theory papers done as per the University guidlines.

Verification / Revaluation

- There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. There shall be revaluation of end semester examination, but not of internal assessment.

Completion of Degree Programme

1) As soon as a student obtains 150 credits (completion of Industrial training (IT) and 75% of the credits from the syllabus excluding IT is essential), the student will be deemed to have completed the requirements of the M.C.A.(Science) degree programme.
2) If a student has failed in a course then the said course will not be taken into account for calculating GPA and overall grade. In fact, all the courses in which a student has passed will be taken into account for calculating the GPA and overall grade.
3) The policies and procedures determined by University will be followed for the conduct of examinations and declaration of the result of a candidate

Course Structure MCA (Science) for Affiliated Colleges

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
I Year Sem-I	Core	CA-101	Programming with C	4	4	50	50	100
	Core	CA-102	DBMS	4	4	50	50	100
	Core	CA-103	Mathematical Foundation	4	4	50	50	100
	Core	CA-104	Concrete Mathematics Graph Theory	4	4	50	50	100
	Core	CA-105	Computer Organisation	4	4	50	50	100
	Core	CA-106	Lab on CA-101 & CA-102	4	5	50	50	100

Minimum Credit : 25, Core Subject is compulsory IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours/ Week	Credit	% of Assessment		
						IA	UE	Total
I Year Sem-II	Core	CA-201	Data Structures	4	4	50	50	100
	Core	CA-202	TCS	4	4	50	50	100
	Core	CA-203	OOP- C++	4	4	50	50	100
	Core	CA-204	Computer Networks	4	4	50	50	100
	Core	CA-205	ADBMS	4	4	50	50	100
	Core	CA-206	Lab. on CA-201,CA-203 & CA-205	4	5	50	50	100

Minimum Credit : 25 , Core Subject is compulsory. IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-III	Core	CA-301	DAA	4	4	50	50	100
	Core	CA-302	Operating System	4	4	50	50	100
	Core	CA-303	Software Engineering	4	4	50	50	100
	Core	CA-304	Java	4	4	50	50	100
	Core	CA-305	Lab. on 302 & 304	4	5	50	50	100
	Elective	CA-306	Project	4	4	50	50	100
	Elective	CA-307	Numerical Methods	4	4	50	50	100
	Elective	CA-308	Multimedia Systems	4	4	50	50	100
	Elective	CA-309	Dot Net	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 29 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Two for Maximum Credit. IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-IV	Core	CA-401	Computer Graphics	4	4	50	50	100
	Core	CA-402	SDK	4	4	50	50	100
	Core	CA-403	Advance Java	4	4	50	50	100
	Core	CA-404	Object oriented Software Engineering	4	4	50	50	100
	Core	CA-405	Lab. on 401,402 &403	4	5	50	50	100
	Elective	CA-406	Project	4	4	50	50	100
	Elective	CA-407	Cyber Law	4	4	50	50	100
	Elective	CA-408	Soft Computing	4	4	50	50	100
	Elective	CA-409	Artificial Intelligence	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 33 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Three for Maximum Credit. IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II IYear Sem-V	Core	CA-501	Internet Programming	4	4	50	50	100
	Core	CA-502	Principle of Programming Langauges	4	4	50	50	100
	Core	CA-503	Data Mining & Warehousing	4	4	50	50	100
	Core	CA-504	Software Project Management	4	4	50	50	100
	Core	CA-505	Lab. on 501,502 &505	4	5	50	50	100
	Elective	CA-506	Project	4	4	50	50	100
	Elective	CA-507	Image Processing	4	4	50	50	100
	Elective	CA-508	E-Commerce	4	4	50	50	100
	Elective	CA-509	Mobile Computing	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 33 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Three for Maximum Credit. IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
III Year Sem-VI	Core	CA-601	Industrial Training /Institutional project	--	17	25	75	100
	Elective	CA-602	Software Testing & Quality Assurance	4	4	50	50	100
		CA-603	Embedded Systems	4	4	50	50	100
		CA-604	Information Security And Audit	4	4	50	50	100
		CA-605	Cloud Computing	4	4	50	50	100

Core Subject is compulsory. If student had completed 133 credit within Five semesters then no need to select any elective course. Otherwise student should select required elective courses to complete 150 credit.

M.C.A. (Science) –I Semester-I
CA101: Programming with C

Objectives :-
i) To develop Problem Solving abilities using computers
ii) To teach basic principles of programming
iii) To develop skills for writing programs using 'C'

1. Introduction to Programming [3-5]
- 1.1 Problem Solving
  - Algorithms, Flowcharts
- 1.2Programming Languages
  - Machine language, Assembly language, Assembler, Higher level language, Compiler and Interpreter

2. Introduction to C [1-2]
- 2.1 Structure of a C program
- 2.2 Functions as building blocks
- 2.3 C Program development life cycle

3. C tokens [2-3]
- 3.1 Keywords
- 3.2 Identifiers
- 3.3 Variables
- 3.4 Constants – character, numeric, string, escape sequences
- 3.5Data types – built-in and user defined
- 3.6 Operators and expressions - types (arithmetic, relational, logical, assignment, bitwise, Conditional, other operators) , precedence and associativity rules.

4. Input and Output [2-3]
- 4.1 Character input and output
- 4.2 String input and output
- 4.3 Formatted input and output

5. Control Structures [7-8]
- 5.1 Decision making structures: if, if-else, switch
- 5.2 Loop Control structures:while, do-while, for
- 5.3 Nested structures
- 5.4 break and continue

6. Functions in C [6-7]
- 6.1 Functions, advantages
- 6.2 Standard library functions

6.3 User defined functions: declaration, definition, function call, parameter passing, return Keyword,
6.4 Scope of variables, storage classes
6.5 Recursion

7. Arrays [4-5]
7.1 Declaration, initialization
7.2 One, two and multidimensional arrays
7.3 Passing arrays to functions

8. Pointers [5-6]
8.1 Declaration, initialization
8.2 Dereferencing pointers
8.3 Pointer arithmetic
8.4 Pointer to pointer
8.5 Arrays and pointers
8.6 Functions and pointers – passing pointers tofunctions, functions returning pointers.
8.7 Dynamic memory allocation

9. Strings [4-5]
9.1 Declaration and initialization
9.2 Standard library functions for String handling
9.3 Strings and pointers
9.4 Array of strings.
9.5Command line Arguments

10. Structures and Unions [5-6]
10.1 Creating structures
10.2 Accessing structure members (dot Operator)
10.3 Structure initialization
10.4 Array of structures
10.5 Passing structures to functions
10.6 Nested structures
10.7 Pointers and structures
10.8 Self referencing structure
10.9 Unions
10.10 Difference between structures and unions

11. C Preprocessor [1-2]
11.1 Format of Preprocessor directive
11.2 File Inclusion directive
11.3 Macro substitution, nested macro, augmented macro

12. File Handling [4-5]
12.1 Streams

12.2 Types of Files
12.3 Operations on files
12.4 Random access to files
12.5 Programing using command line arguments

13. Introduction to Graphics [2-3]

13.1 Initialization graphics

13.2 Graphics Library function – putpixel, getpixel, functions to draw simple geometrical figures.

References

1. How to Solve it by Computer, R.G. Dromey, ISBN:9788131705629, Pearson Education
2. Problem Solving with C, Harrow , ISBN:9788131734391, Pearson Education
3. Programming in ANSI C, E. Balaguruswamy,ISBN:9781259004612,Tata Mc-Graw Hill Publishing Co.Ltd.-New Delhi
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
5. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
6. Programming in C (2nd Edition) by Ashok Kamthane, Pearson
7. C Programming by YashwantKanitkar,BPB Publication
8. "Simplifying C", Harshal *A.* Arolkar *and* Sonal Jain, Wiley IndiaDreamtech Press, August 2010. (ISBN: 978-93-5004-049-2)
9. Using the GNU Compiler Collection, Richard M. Stallman, GCC Developer community ISBN:9781441412768,Createspace

CA102: Database Management System

Sr. No.	Chapter No.	Name of Chapter and Contents	No. of Lect.	Reference
1	1	**Introduction to Database Systems** 1.1 Introduction 1.2 Basic Concepts and Definition 1.2.1 Data 1.2.2 Information 1.2.3 Data Versus Information 1.2.4 Data warehouse 1.2.5 Metadata 1.2.6 Data Item or Field 1.2.7 Records 1.2.8 Data Dictionary 1.2.9 Database 1.2.10 Database System 1.3 Database Users and Database Administrator 1.4 Functions and Responsibilities of DBA 1.5 File-oriented System versus Database System 1.6 View of Data 1.7 Database Languages 1.8 Schemas, Sub-schemas and Instances 1.9 3-Level Architecture 1.9.1 Internal Level 1.9.2 Conceptual Level 1.9.3 External Level 1.10 Data Independence 1.10.1 Physical Data Independence 1.10.2 Logical Data Independence 1.11 Structure of a DBMS 1.12 Functions of DBMS 1.13 Data Models	3-5	1,2

2	2	**Physical Data Organization** 2.1 Introduction 2.2 Physical Storage Media 2.3 RAID Technology 2.4 Basic concepts of File 2.4.1 File Types 2.4.2 Buffer Management 2.4.3 File organization 2.5 Indexing	2-4	1,2
3	3	**Relational model** 3.1 Introduction 3.2 Structure of Relational Database 3.3 Relational Algebra 3.3.1 Selection Operation 3.3.2 Projection Operation 3.3.3 Union Operation 3.3.4 Cartesian Product Operation 3.3.5 Difference Operation 3.3.6 Intersection Operation 3.3.7 Division Operation 3.3.8 Rename Operation 3.3.9 Join operation	5-7	1,2
5	5	**SQL** 4.1 Introduction 4.2 Basic Structure 4.3 Aggregate Functions 4.4 Null Values 4.5 Nested Subqueries 4.6 Views 4.7 Complex Queries 4.8 Modification of Database 4.10 Integrity and Security Constraints 4.11 Security and Authorization	7-11	2,4
4	4	**Database and Relational Database Design** 5.1 Introduction 5.2 Basic E-R Concepts 5.3 keys 5.4 Constraints 5.5 Entity Set	8-10	1,2

		5.5.1 Strong Entity Set		
		5.5.2 Week Entity Set		
		5.6 E-R Diagram Symbol		
		5.7 E-R Diagram		
		5.8 Extended E-R Features		
		5.9 Conversion of E-R Model into Relations		
		5.10 Functional Dependency		
		5.11 Full Functional Dependency		
		5.12 Armstrong's Axioms		
		5.13 Redundant Functional Dependencies		
		5.14 Closures of a set of Functional Dependencies		
		5.15 Decomposition		
		5.16 Normalization		
		5.17 Normal forms		
		5.17.1 First Normal Form		
		5.17.2 Second Normal Form		
		5.17.3 Third Normal Form		
		5.17.4 Boyce-Codd Normal Form (BCNF)		
		5.17.5 Fourth Normal Form		
		5.17.6 Fifth Normal Form		
6	6	**Transaction Management**	4-6	1,2
		6.1 Transaction Concepts		
		6.2 Transaction Properties		
		6.3 Transaction States		
		6.4 Concurrent Execution		
		6.5 Serializability		
		6.6 Recoverability		
7	7	**Concurrency Control & Database Recovery System**	10-12	1,2
		7.1 Introduction		
		7.2 Lock based Protocols		
		7.2.1 Locks		
		7.2.2 Granting of locks		
		7.2.3 Two Phase Locking Protocol		
		7.2.4 Time Stamp-Based protocol		
		7.2.5 Thomas Write Rule		
		7.2.7 Multiple Granularity		
		7.2.8 Deadlock Handling		
		7.3 Database Recovery Concepts		
		7.4 Types of Database Recovery		
		7.5 Recovery Technique		

7.5.1 Deferred Update
7.5.2 Immediate Update
7.6 Buffer Management

Recommended Books:

- Database Systems: Concepts, Design and Applications, Singh, ISBN:9788131760925, Pearson
- Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, ISBN: 9780072465631, TMH
- Database Systems Concepts, Abraham Silberschatz, Henry Korth, S. Sudarshan, ISBN: 9780071244763, TMH
- Database Systems, Connolly, ISBN:9788131720257, Pearson
- A Guided Tour of Relational Databases and Beyond, Levene, ISBN:9788181280510, Springer
- Fundamentals of Database Management Systems, Gillenson, ISBN:9788126517930, Wiley India
- Database Design and Relational Theory C.J. Date, ISBN:9789350237298,O'Reilly
- An Introduction to Database Systems, Date/Kanna, ISBN, 9788177585568 , Pearson
- Fundamentals of Database Systems, Elmasri, ISBN:9788131716250 , Pearson
- Database-Principles, Programming and Performance, O'Neil, ISBN:9789380501284, Elsevier
- Database System Implementation, Garcia-Molina, ISBN:9788131704134, Pearson

CA 103- Mathematical Foundation

1. **SET THEORY** [5To 7 Lectures]
1.1 Sets, Subsets
1.2 Operations on Sets
1.3 De Morgan's Laws
1.4 Power Set of a Set
1.5 Cartesian Product
1.6 Equivalence relation
1.7 Partition of a Set
1.8 Partial order on a set

2 PROPOSITIONAL CALCULUS [4 To 5Lectures]
2.1 Propositions
2.2 Logical connections
2.3 Truth tables
2.4 Logical equivalence
2.5 Tautology and contradiction

3PREDICATE CALCULUS [5To 6 Lectures]
3.1 Predicates
3.2 Valid arguments and proofs.
3.2.1 Proofs using truth tables
3.2.2 Direct proof
3.2.3 Indirect proof
3.3 Quantifiers(up to two variables)

4. INTRODUCTION TO ALGEBRA
Relations and Functions [7 To 8 Lectures]
4.1 Ordered Pairs, Cartesian product of Sets.
4.2 Relations, types of relations, equivalence relations, Partial Ordering.
4.3 Equivalence Class, Properties of Equivalence Class.(without proof)
4.4 Definition of function as relation
4.5 Injective, Surjectivefunction ,Bijective function
4.6Composition of two functions, Inverse Function

5. **INTEGERS** [12To 14 Lectures]
5.1 Divisibility of Integers
5.2 Definition and Properties
5.3.Division Algorithm
5.4 Divisibility and its properties
5.5 GCD, Euclidean Algorithm
5.6 Properties of GCD
5.7 Modular Arithmetic

5.7.1 Congruence relation
5.7.2 Euler's theorem statement and examples
5.7.3 Definition of binary operation
5.7.4 Composition table

6POLYNOMIALS [5 To 6 Lectures]
6.1 Definition of polynomial, Equality, addition, multiplication of two polynomials
6.2 Divisibility in Polynomials, Properties of divisibility
6.3 GCD of two polynomials using Euclidean Algorithm
6.4 Roots of a polynomial(by A.P,G.P)

7PERMUTATION [4To 5 Lectures]
7.1 Definition of permutation
7.2 Multiplication of two permutations
7.3 Cycle, transposition
7.4 Even and odd permutation

8. Matrices [6 To 9Lectures]
8.1 Definition of matrix
8.2 Matrix operations
8.3 Transpose and powers of matrices
8.4 Symmetric matrix
8.5 Inverse of a matrix(by adjoint method)
8.6Echelon form of the matrix
8.7 Solving system of linear equations using
- Cramer's rule
- Inverse
- Guass elimination method

Reference Books :

1.
2. Discrete Mathematical Structures : Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Nadeen-Ur-Rehman.
3. Discrete Mathematics And Its Applications: Rosen
4. M Artin, Algebra,prentice hall of India , New Delhi(1994)
5. Elementary linear algebra : Howard Anton
6. Discrete Mathematics Rajendra Akerkar , Rupali Akerkar Pearson Publication
7. Discrete Mathematics with Applications, Thomas Koshy, Elsevier Academic Press, ISBN: 9788181478870
8. Discrete Structures, Logic, and Computability, James Hein, Jones & Barlett Student Edition, ISBN:9789380108391

CA -104 Concrete Mathematics and Graph Theory

Graph Theory

1. Graphs

Definition and examples of graphs, Incidence and degree, Handshaking lemma, Isomorphism, Sub-graphs, Walks, Path, Circuits, Connected and disconnected graphs, Euler graphs, Operations on graphs. Hamiltonian Graphs, Traveling Salesman problem (Reference Book No.1. Chapter 1, 2)

Algorithms: Connectedness algorithm, Shortest Path Algorithm (Reference Book No. 1., Chapter 11) ,Fleury's Algorithm, Chinese Postman problem, Product of two graphs, Complement of a graph, Self Complement of a graph(Reference Book No.5) (8-10 Lectures)

2. Trees

Definition and properties of trees, Pendent vertices, centre of a tree, Rooted and binary tree, spanning trees, minimum spanning tree algorithms, Fundamental circuits, cutsets and cut vertices, fundamental cutsets, connectivity and separativity, max-flow min-cut theorem (Reference Book No. 1. Chapter 3, 4 for max-flow, min-cut theorem, Chapter 14) (8-10 Lectures)

3. Planar Graphs

Planar Graphs, Kuratowski's graphs, (Reference Book No.1. Chapter 5) (2 Lectures)

4. Matrix Representation of Graphs

Incidence, Adjacency Matrices and their properties

(Reference Book No.1. Chapter 7) (2 Lectures)

5. Coloring

Chromatic Number, Chromatic Polynomial, (Reference Book No. 1. Chapter 8) (2 Lectures)

6. Directed Graphs

Types of digraphs, directed paths and connectedness, Euler digraphs, Directed trees, Arborescence, Tournaments, Acyclic digraphs, Polish notations.

(Reference Book No. 1. Chapter 9) (5-6 Lectures)

Concrete Mathematics

1. Cryptography and Number Theory

Cryptography and Modular Arithmetic, Private Key Cryptography, Public-key Cryptosystems, Arithmetic modulo n, Cryptography using multiplication mod n, Inverses and GCD, Solutions to

Equations and Inverses mod n, Inverses mod n, Converting Modular Equations to Normal Equations, Greatest Common Divisors(GCD), Euclid's Division Theorem, The GCD Algorithm, Extended GCD algorithm, Computing Inverses, The RSA Cryptosystem, Exponentiation mod n, The Rules of Exponents, Fermat's Little Theorem, The Chinese Remainder Theorem , Applications(Reference Book No.6. and No.7) (15-18 lectures)

2. Recursion

Recursion, First order linear recurrences, Solving recurrences, Exponential generating functions (Reference Book 6, 7) (6-8 lectures)

References:

1. Graph Theory with Applications to Engineering and Computer Science, Deo, Narsing [1974], Prentice Hall
2. Concrete Mathematics, A Foundation for Computer Science, Graham R.M., D.E.Knuth [1989], Addison Wesley.
3. Graph Theory with Applications, Bondy, J. A. & U. S. R. Murty [1976], MacMillan
4. Graph, Networks and Algorithms, Swamy, M. N. S. & K. Tulsiram [1981], John Willey
5. A First Look at Graph Theory, John Clark, D.A .Holton.
6. A Course in Number Theory and Cryptography Second Edition by Neal, Koblitz.(Springer).
7. Discrete Mathematics for Computer Scientists-Clifford Stein, Kenneth Bogart, Robert Drysdale, Pearson Publication.

CA- 105 Computer Organizations

1. **Digital Circuits** [14-15]
   - Gates - Basic gates , derived gates, positive and negative logic 2
   - Simplification of logic circuits, De-Morgans theorem, Concept of K map and simplification of sungle expressions (upto 4 variables) 2
   - Combinational circuits 1
   - Half adder, full adder, half subtractor 1
   - Multiplexer (4 to 1), Demultiplexer (1 to 4) using AND-OR gates, AND gates 2
   - Encoder - Decimal to BCD 1
   - Decoder - 3 to 8 decoder using gates 1
   - Sequential circuits - concept of flip flop, need for clock, concept of triggering 1
   - SR, JK, D and T flip flops 2
   - Concept of counter, types, concept of registers, types and applications 2

2. **CPU Organization** [4-6]
   - Functions of CPU 1
   - General registers used in CPU -PC, SP, instruction pointer, instruction register, instruction decoder, flag, general purpose registers, memory address register, memory byte register 2
   - General register organization of CPU 1
   - Concept of stack, instructions used with stack 1
   - Block diagram of ALU 1

3. **Memory organization** [8-9]
   - Memory hierarchy 1
   - Use of cache memory, address mapping with cache 2
   - Associative memory 2
   - Virtual memory 2
   - Memory management through segmentation and paging 1

4. **I/O Organization** [13-14]
   - Interfacing concept and need, general structure of an interface, block diagram of parallel interface and function of blocks 2
   - Concept of interrupt, IVT, size of IVT and processor response 1
   - Types of I/O transfer, CPU initiated, interrupt initiated, DMA (only concept) 2
   - Data convertors - DAC, ADC (flash, successive approximation and dual slope ADC) 3
   - Serial communication and types 2
   - Working of UART with block diagram, Serial communication standards USB 2

- PCI bus standard 1

5. Architecture of Microprocessor [3-5]

- Block diagram of 8086 and function of blocks 1
- 8086 Registers 2
- Numeric co-processor - Concept , block diagram and functions of blocks 2

6. Parallel Processing [9-11]

- Concept of parallelism 1
- Parallel computer structures 2
- Concept of pipelining, Pipelined computers 1
- Instruction pipeline, Arithmetic pipeline 2
- Concept of RISC and CISC 2
- RISC pipelining 1

Reference Books:

1. Electronic Principles, Tata McGraw-Hill, 7th Edition by Albert Malvino and David Bates
2. Modern Digital Electronics, 3 edition, R P Jain
3. Digital Design 4e, Mano, ISBN:9788131714508, Pearson
4. Digital Logic & Computer Design, Mano, ISBN:9788177584097, Pearson
5. Computer Systems Organization & Architecture- John D. Carinelli Pearson publication.
6. Digital Design and Computer Architecture 2nd Edition , Harris, Morgan Kauffman Publishers(Elesevier) ISBN:9789382291527

M.C.A. (Science) –I Semester-II
CA 201: Data Structures

Objectives :-
i) To understand the different methods of organizing data in computer memory.
ii) To efficiently implement the different data structures.
iii) To efficiently implement the solutions for specific problems.

0. Prerequisites
Concept of Structures and pointers

1. Introduction to Data Structure [2-3]
1.1 Concepts
1.2 Data types, ADT (Abstract Data Type)
1.3 Types of data structure

2. Algorithm Analysis [2-3]
2.1 Space complexity
2.2 Time complexity
2.3 Asymptotic Notations (Big O, Omega, Theta)

3. Linear data structure [6-8]
3.1 Array as linear data structure
3.2 Representation of array in memory
- Row major, Column major
3.3 Sorting Algorithms & their time complexity
- Bubble, Insertion, Quick, Merge sort
3.4 Searching Algorithms & their time complexity
- Linear Search, Binary Search

4. Linked List [8-10]
4.1 Introduction
4.2 Types – Singly, doubly, singly circular, doubly circular
4.3 Dynamic representation.
4.4 Operations on linked list.
4.5 Generalized Linked List – Concept & representation.
4.6 Applications
- Polynomial representation, addition of two polynomials

5. Stack [6-8]
5.1 Introduction
5.2 Representation : static and dynamic
5.3 Operations on stack.
5.4 Applications

- Convert expression Infix to Postfix, Infix to Prefix
- Evaluation of Postfix and Prefix expression

5.5 Concept of multiple stacks

6. Queue [6-7]

6.1 Introduction
6.2 Representation: static and dynamic
6.3 Operations on queue
6.4 Circular queue, priority queue, DeQue
6.5 Concept of multiple queues.

7. Tree [10-11]

7.1 Concept & terminologies
7.2 Binary tree
- Representation: static and dynamic
- Types: full, complete, skewed.
- Traversal: inorder, preorder, postorder.

7.3 Binary Search Tree
- Concept & Operations: create, insert, delete.

7.4 Height balanced tree – AVL tree, rotations(No programming implementation)
7.5 Application
- Heap Sort, Expression tree

8. Graph [6-7]

8.1 Concept & terminologies
8.2 Representation: Adjacency matrix, Adjacency list.
8.3 Traversal: DFS, BFS
8.4 Spanning tree, minimum cost spanning tree,
Prim's Algorithm and Kruskals Algorithm (No programming implementation)
8.5 Applications
- AOV network, topological sort
- AOE network, critical path
- Shortest path: Dijkstra's algorithm .

9. Hashing [2-3]

9.1 Hash table concepts
9.2 Hash functions
9.3. Overflow handling techniques (No programming implementation)

References:

1. Data Structures Using C, ISBN:9788131722381,Bandyopadhyay,Pearson
2. Introduction to Data Structures in C, ISBN:9788131713921,Kamthane,Pearson
3. Data Structures and Program Design in C , ISBN:9788177584233,Kruse,Pearson\
4. Data Structures Using C, ISBN:9788131702291,Tenenbaum,Pearson
5. Data structures and Algorithm Analysis in C, 2e, ISBN:9788177583588,Weiss,Pearson
6. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahani (Galgotia)
7. Data Structures and Algorithms, ISBN: 9788177588262, Aho, Pearson
8. Data Structure and Algorithm, Maria S. Rukadikar, ISBN:9789350235553, Shroff

CA- 202: Theoretical Computer Science

1) Preliminaries [2-3 Lectures]
   - Symbol, Alphabet, String, Prefix& & Suffix of Strings, Sets, Operations on sets, Finite & infinite sets, Russell's Paradox, Cator's Diagonal Argument, Formal Language
   - Relation, Equivalence Relation,(reflexive, transitive and symmetric closures)
   - Principle of Induction
2) Regular Languages [14-16 Lectures]
   - Regular Expression: Definition, Examples, & Identities
   - Finite Automata: Concept
   - DFA: Definition & examples
   - - NFA: Definition, examples, Language accepted By FA, NFA with ∈- moves
   - Regular Expression to FA: Method and Problems
   - NFA with ∈- moves to NFA,
   - NFA to DFA: Method Problems
   - Minimization of DFA: Problem using Table Method
   - FA with output: Moore & Mealy Machines:
   - Definition and their equivalence
   - Application of FA: Pumping Lemma & Examples
   - Closure Properties: Union, Intersection,
   - Concatenation, Complement, & Kleene Closure
3) Context Free Languages [15-17 Lectures]
   - Chomsky Hierarchy
   - CFG : Definition & examples
   - Ambiguous Grammar : Concept & Examples
   - Simplification of CFG : Removing Useless
   - Symbols, removing unit productions and removing Nullable symbols : Methods & Problems
   - Normal Forms : CNF & GNF : Method & Problems
   - Regular Grammar : Definition ,Equivalence of FA & Regular Grammar
   - PDA : Basic Concept , Definition (DPDA & NPDA)
   - Construction of PDA using empty stack and final
   - State method : Examples using stack method
   - Equivalence between acceptance by final state
   - And Empty stack method & examples
   - Equivalence between PDA & CFG (in GNF): Method and examples
4) Properties of Context Free Languages [1-2 Lectures]
   - Pumping Lemma for CFL : methods & problems
   - Closure Properties of CFL's(Union,
   - Concatenation, & Kleene Closure) : Method & Examples)
5) Turing Machine [9-11 Lectures]
   - Recursive & recursively enumerable language
   - Introduction to LBA (Basic Model) & CSG.
   - Definition Of TM,
   - Design of TM for language recognition

- Types of Turing Machine (Multitape TM, NonDeterministic TM,Universal TM, Restricted TM)
- Undecidable Problem, Halting Problem of TM
- Simple Arithmetic Problems on Unary Numbers using TM

References:

1. Introduction to Automata Theory , Languages ,And Computation (2nd Edition Pearson education) By –John E. Hopcroft , Rajeev Motwani, Jeffrey D. Ullman
2. An Introduction to Formal Languages and Automata, Peter Linz, Jones & Barlett Student Edition, ISBN: 9789380853284
3. Fundamentals of Theory of Computation, Principals and Practice, Greenlaw, Hoover, Elsevier, ISBN:9781558604742
4. Introduction to Computer Theory By - Daniel I.A. Cohen (John Wiley & Sons (ASIA) Pre Ltd. 2nd Edition)
5. An Introduction to the Theory of Computer Science Languages & Machine (3rd Edition Pearson education) By Thomas A. Sudkamp
6. Introduction to Languages and the theory of Computation By – John C.Martin (Tata McGraw –Hill Edition, 2nd Edition)
7. Theory of Computer Science (Automata Languages And Computation By – K.L.P.Mishra & N. Chandrasekaran (Prentice –Hall India 2nd Edition)
8.

CA-203 Object Oriented Programming (C++)

Prerequisites

To study object oriented programming concepts and programming it is important to students must have knowledge of C programming language. The object oriented features include the base of programming language. C++ is the extension of C language. It will be beneficial with the background of C language. Mathematical foundation is an additional advantage.

General Description

This course provides an introduction to object oriented programming concepts using the C++ programming language. The course assumes knowledge in C Language. The course emphasis is on the object orientated facilities of C++ and how they can be used to create structured, modular and re-usable code. C++ is an extension of C language which is widely used all over. It is powerful programming language that combines power, elegance and flexibility of C and the features of object oriented programming. With its object oriented capabilities like data abstraction, inheritance, operator overloading, polymorphism, stream handling. It supports software engineering benefits over C language.

Objectives

To understand the fundamental Object Oriented Concepts.
To solve simple and moderately complex problems using C++.
To understand the implementation of various data structures and algorithms.
To Understand and modify Open Source software written in C and C++.
After completing this course, student will be able to identify the benefits of using C++ and object-oriented programming techniques for application development.

1. Introduction to C++ — **2-4 lectures**

Starting with C++
How C++ evolved from C?
Features of C++
Procedure-oriented programming
OOP vs. procedure-oriented programming
The basic anatomy of a C++ program
Starting with a simple "Hello World" program
Compiling, linking and running a C++ program

2. Object-Oriented Programming Concepts — **3-4 lectures**

Abstraction
Inheritance
Polymorphism

Data Binding
Encapsulation
Classes and Objects

3. Introduction to C++ programming — **10-11 lectures**

Data Types, new operators and keywords, Type casting in C++, reference variables, arrays etc.
Classes and Objects
Classes and Access Specifiers
Defining data members and member functions
Array of objects
Usage of namespace
Managing Console I/O
Usage of Manipulators
Static Members
Call by reference, return by reference
Inline Function
Friend Function
Function overloading

4. Constructer & Destructor — **2-4 lectures**

Introduction
Types of constructor
Destructor

5. Operator Overloading — **8 -9 lectures**

Overloading unary and binary operators
Usage of this pointer
Overloading using friend functions
Overloading "<<" and ">>" operator
Type Conversion

6. Inheritance — **6-8 lectures**

Introduction
Types of Inheritance
Base class and derived class examples
Virtual base class
Abstract class
Polymorphism
Virtual functions and pure virtual functions
Overriding

7. Files — **6-8 lectures**

Classes for file stream operations1
Opening and closing a file

Detecting end of file
File pointers and their manipulations
File updation with random access

8. Templates **2-4 lectures**
Defining templates
Function templates
Derivations and templates
Examples of templates

9. Exception Handling **1-2 lectures**
Introduction
Exception handling mechanism

Reference Books :

[1] Object Oriented Programming (C++) – Balaguruswamy
[2] The C++ Programming Language - Bjarne Stroustrup
[3] Thinking in C++ - Bruce Eckel
[4] C++ Programming Today – Barbara Johnstron
[5] Problem Solving with C++ - Walter Savitch
[6] Object Oriented Programming with C++, Mahesh Bhave, Sunil Patekar Pearson Publication

CA-204: Computer Networks

Total no. of lectures- 50

Ch no	Title	Total Lectures	Reference Books
1	**Introduction to Computer Networks**	5-6	
	Data Communication . characteristics of data communication, components, data representation, data flow.		Forouzan Ch.1
	Computer Networks Distributed processing, Physical structure-Point to Point, Broadcast, Categories of topology (mesh,star,ring,bus,etc.)		
	Categories of network LAN,WAN,MAN,INTERNET etc.		
	Protocols and Standards Definition of protocol, key elements , Defacto & Dejure standard, Standards organizations.		
	Network Software Protocol Hierarchies layers, protocols, peers, interfaces, network architecture, protocol stack design issues of the layers – addressing, error control, flow control, multiplexing and de-multiplexing, routing Connection-oriented and connectionless service . Service Primitives – listen, connect, receive, send, disconnect . The relationships of services to protocol		Tanenbaum Ch. 1
2	**Network Models**	3-4	
	OSI Reference model Functionality of each layer **TCP/IP model**		Forouzan Ch.2

	Introduction to IP,TCP & UDP TCP/IP Protocol Suite **Addressing** Physical, Logical & Port addresses		
3	**The Physical Layer**	7-8	
	The Basic Concepts of analog & digital signals . Bit rate, bit length, base band transmission . Transmission Impairments – attenuation, distortion and noise Data Rate Limits – Nyquist's bit rate formula for noiseless channel and Shannon's law . Problems on above concepts		Forouzan Ch.3,
	Performance of the Network Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter Problems on above concepts		Forouzan Ch.3
	Line Coding digital to digital conversion Characteristics, Line Coding Schemes Unipolar, NRZ, RZ, Manchester and Differential Manchester		Forouzan Ch.4
	Transmission Modes . Parallel Transmission . Serial Transmission – Asynchronous and Synchronous		Forouzan Ch.4
	Multiplexing FDM, TDM, WDM.		Forouzan Ch.6
	Switching Circuit Switching, Message Switching and Packet Switching		Tenenbum ch 2
4	**The Data Link Layer**	3-5	
	Framing . Character Count, Byte Stuffing, Bit Stuffing and Physical Layer Coding Violations **Error Control** Hamming Code and CRC **Elementary data link protocols** Simplex stop & wait protocol, Simplex protocol for noisy channel. **Sliding Window Protocols** . 1-bit sliding window protocols, Pipelining – Go-Back N and Selective Repeat		Tanenbaum ch 3
5	**The Medium Access Sub layer**	3-5	
	Random Access Protocols . ALOHA – pure and slotted		Forouzan Ch.12

	CSMA – 1-persistent, p-persistent and nonpersistent CSMA/CD, CSMA/CA **Controlled Access** . Reservation, Polling and Token Passing **Channelization** . FDMA, TDMA and CDMA			
6	**Wired & wireless Lans** **Ethernet Standard** . Frame Format, Access Method and Physical Layer . Changes In The Standard – Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet . Fast Ethernet – Goals and MAC Sub layer Specifications . Gigabit Ethernet – goals, MAC Sub layer Specifications **Wireless Lan** Architecture – BSS & ESS	2-4	Forouzan Ch.13 Forouzan Ch.14	
7	**The Network layer** **Design Issues** . Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram **Logical Addressing** . IPV4 Addresses – Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation(NAT) IPV6 Addresses – Addressing Structure, Address Space **IPV4 Protocol** . Datagram Format, Fragmentation, Checksum, Options **IPV6 Protocol** . Advantages, Packet Format, Extension Headers **Transition From IPV4 to IPV6** . Dual Stack, Tunneling, Header Translation **Routing Concepts** . Properties of routing algorithm, Comparison of Adaptive and Non-Adaptive Routing Algorithms **Congestion Control**	9-11	Tanenbaum ch 5 Forouzan Ch 19 Forouzan Ch 20 Tanenbum ch 5	

		. General Principles of Congestion Control, Congestion Prevention Policies		
	8	The Transport layer **Process-to-Process Delivery** . Client Server Paradigm, . Multiplexing and De-multiplexing, . Connectionless Vs Connection-Oriented Service, . Reliable Vs Unreliable	5-6	Forouzon ch 23
		User Datagram Protocol UDP . Datagram Format, Checksum, UDP operations, Use of UDP		Forouzon ch 24
		Transmission Control Protocol (TCP) . TCP Services, . TCP Features, . TCP Segment, . TCP Connection, . Flow Control, Error Control **TCP Congestion Control** . Slow Start Mechanism Introduction to SCTP		Forouzon ch 23
	9	**The Application layer** **Domain Name System (DNS)** Name Space, . Domain Name Space, . Distribution of Name Space, . DNS in the Internet, Name – Address Resolution	5-7	Forouzon ch 25
		TELNET . Timesharing Environment, . Logging, NVT, Embedding, Options, . Mode of Operations		Forouzon ch 26
		E-MAIL . Architecture, . User Agent, . Message Transfer Agent-SMTP, . Message Access Agent-POP, IMAP, . Web Based Mail		Forouzon ch 26
		File Transfer Protocol (FTP) . Communication over control connection, . Communication over Data Connection, Anonymous FTP		Forouzon ch 26
		WWW . Architecture, . WEB Documents		Forouzon ch 27
		HTTP		Forouzon ch 27

. HTTP Transaction,
. Persistent and Non-persistent Connection,
. Proxy Server

Reference Books:

1. Computer Networks, Tanenbaum, ISBN:788177581652, Pearson
2. Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.Fourth edition
3. Computer Networking and the Internet,Halsall / Kulkarni, ISBN:9788177584752, Pearson
4. Data Communications and Networks: An Engineering Approach, Irvine, Wiley India, ISBN:9788126507658
5. Elements of Network Protocol Design, Gouda, ISBN:9788126516476, Wiley India
6. Computer Networks-A Systems Approach, 5e , Peterson, ISBN :9789380501932, Elsevier

CA-205: Advance Database Concepts

Chapter No.	Topics	No. of Lect.	Ref. Books
1	Object-Oriented Databases 1.1 Introduction 1.2 Object-Oriented data model Characteristics of Object-Oriented databases Comparison of an OOMD and ER model 1.3 Concepts of OODB Objects Object Identity Object Attributes Classes Relationship or Association among objects Structure, Inheritance and Generalization Operation Polymorphism Advantages of OO Concept 1.4 Object-oriented DBMS(OODBMS) Features of OODBMSs Advantages of OODBMSs Disadvantages of OODBMSs 1.5 Object Data Management Group(OMDG) and Object-oriented languages Object Model Object Definition Languages(ODL) Object Query Languages(OQL)	7-9	Book 1, 2
2	Object-Relational Database 2.1 Introduction 2.2 History of Object-relational DBMS(ORDBMS) Weekness of RDBMS Complex Objects Emergence of ORDBMS 2.3 ORDBMS Design Challenges of ORDBMS Features of ORDBMS Comparison of ORDBMS and OODBMS Advantages of ORDBMS Disadvantages of ORDBMS	3-5	Book 1
3	Database Security 3.1 Introduction 3.2 Goals of database security Threats to database security Types of database security issues Authorisation and authentication	6-8	Book 1

	3.3 Discretionary Access control Granting/Revoking privileges Audit Trails 3.4 Mandatory access control 3.5 Firewalls 3.6 Statistical database Security 3.7 Data Encryption Simple substitution method Polyalphabetic substitution method		
5	**Parallel Database Systems** 1.1Introduction 1.2Parallel Databases Advantages , Disadvantages 1.3Architecture of parallel Databases Shared-memory Multiple CPU Parallel Database Architecture Shared-disk Multiple CPU Parallel Database Architecture Shared-nothing Multiple CPU Parallel Database Architecture 1.4 Key Elements of Parallel Database Processing Speed – up Scale- up Synchronization Locking 1.5 Query Parallelism I/o Parallelism (Data Partitioning) Intra-query Parallelism Inter –Query Parallelism Intra Operation Parallelism Inter Operation Parallelism	6-8	Book 1, 2
	Distributed Database Systems 2.1 Introduction 2.2 Distributed Databases Difference between Parallel and distributed databases Desired properties of Distributed Databases Types of Distributed Databases Desired function of Distributed Databases Advantages & Disadvantages of Distributed Databases 2.3 Distributed Database System Design Data Fragmentation , Data Replication, Data Allocation 2.4 Concurrency control in Distributed database	8-10	Book 1, 2

	Distributed Locking, Distributed Deadlock, Timestamping 2.5 Recovery control in Distributed database 2- Phase Commit Protocol		
6	**Multimedia Databases** Multimedia Sources Multidatabase Queries Multidabase Applications **Mobile Databases** Architecture Characteristics of mobile computing Mobile DBMS Commercial MD **Spatial Databases** Spatial Data Spatial Database Characteristics Spatial Data Model Spatial Database Queries **Introduction to Big-data and its applications**	6-8	Book 1, 2

Reference Books :-

1) Database Systems: Concepts, Design and Applications, Singh, ISBN:9788131760925, Pearson
2) Database Systems Concepts, Abraham Silberschatz, Henry Korth, S. Sudarshan, ISBN: 9780071244763, TMH
3) Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, ISBN: 9780072465631, TMH
4) Advanced Database Management system, Chakrabarti, ISBN: 9788177228021, Wiley India

M. Sc. / M. C. A. Human Rights Education Syllabus 2013-14

Course Code - 191 , 291

The syllabus

Course I

Introduction to Human Rights and Duties

Credit: 1

I) **Basic Concept**
   a) Human Values- Dignity , Liberty, Equality , Justice, Unity in Diversity, Ethics and Moras
   b) Meaning and significance of Human Rights Education

II) **Perspectives of Rights and Duties**
   a) Rights: Inherent-Inalienable-Universal- Individual and Groups
   b) Nature and concept of Duties
   c) Interrelationship of Rights and Duties

III) **Introduction to Terminology of Various Legal Instruments**
   a) Meaning of Legal Instrument- Binding Nature
   b) Types of Instruments: Covenant-Charter-Declaration-Treaty-Convention-Protocol-Executive Orders and Statutes

IV) **United Nations And Human Rights**
   a) Brief History of Human Rights- International and National Perspectives
   b) Provision of the charters of United Nations
   c) Universal Declaration of Human Rights- Significance-Preamble
   d) Civil and Political Rights-(Art. 1-21)
   e) Economic, Social and Cultural Rights-(Art.22-28)
   f) Duties and Limitations-(Art. 29)
   g) Final Provision (Art. 30)

Course II

Human rights of vulnerable and disadvantaged groups

Credit: 1

I) General Introduction
   a) Meaning and Concept of Vulnerable and Disadvantaged
   b) Groups, Customary, Socio-Economic and Cultural Problems of
   c) Vulnerable and Disadvantaged Groups

II) Social status of women and children in International and national perspective

   a) Human Rights and Women's Rights –International and National Standards
   b) Human Rights of Children-International and National Standards

III) Status of Social and Economically Disadvantaged people

   a) Status of Indigenous People and the Role of the UN
   b) Status of SC/ST and Other Indigenous People in the Indian Scenario
   c) Human Rights of Aged and Disabled
   d) The Minorities and Human Rights

IV) Human rights of vulnerable groups

   a) Stateless Persons
   b) Sex Workers
   c) Migrant Workers
   d) HIV/AIDS Victims

Course III

Human Rights and Duties in India: Law, Policy, Society and Enforcement Mechanism

Credit: 1

I. Human Rights in Indian Context
   a) Indian Bill of Rights And Sarvodaya
   b) Preamble- Fundamental Rights- Directive Principles-Fundamental Duties

II. Human Rights- Enforcement Mechanism
   a) Human Rights Act, 1993
   b) Judicial Organs- Supreme Court (Art 32) And High Courts(Art 226)
   c) Human Rights Commission- National and State of Maharashtra
   d) Commission of Women, children , Minority, SC/ST
   e) Survey of International Mechanism

III. Human Rights Violations and Indian Polity
   a) Inequalities in society-population-illiteracy-poverty-caster-inaccessibility of legal redress
   b) Abuse of Executive Power-Corruption-Nepotism and favoritism
   c) Human Rights and Good Governance
   d)

IV. Role of Advocacy Groups
   a) Professional Bodies: Press, Media, Role of Lawyers-Legal Aid
   b) Educational Institutions
   c) Role of Corporate Sector
   d) NGO's

(2013-14) Introduction to Cyber Security / Information Security: Syllabus

Course Code - 192, 292

Introduction to Cyber Security / Information Security

Syllabus for 'Introduction to Cyber Security / Information Security' program* for students of University of Pune is given below.

The program will be of 4 credits and it will be delivered in 60 clock hours**.

*: Course material for this program will be developed by CINS

**: These clock hours also includes practical sessions and demonstrations wherever required.

SR. NO.	TOPIC	HOURS	MARKS
1	**Module 1: Pre-requisites in Information and Network Security**	**14**	**25**
	Chapter 1: Overview of Networking Concepts	3	
	Chapter 2: Information Security Concepts	3	
	Chapter 3: Security Threats and Vulnerabilities	5	
	Chapter 4: Cryptography / Encryption	3	
2	**Module 2: Security Management**	**13**	**25**
	Chapter I: Security Management Practices	7	
	Chapter 2: Security Laws and Standards	6	
3	**Module 3: Information and Network Security**	**13**	**25**
	Chapter 1: Access Control and Intrusion Detection	3	
	Chapter 2: Server Management and Firewalls	4	
	Chapter 3: Security for VPN and Next Generation Technologies	6	
4	**Module 4: System and Application Security**	**20**	**25**
	Chapter 1: Security Architectures and Models	5	
	Chapter 2: System Security	5	
	Chapter 3: OS Security	5	
	Chapter 4: Wireless Network and Security	5	

Detail Syllabus for Credit Course for University of Pune

Module 1: Pre-requisites in Information and Network Security

Chapter 1: Overview of Networking Concepts

1. Basics of Communication Systems
2. Transmission Media
3. Topology and Types of Networks
4. TCP/IP Protocol Stacks
5. Wireless Networks
6. The Internet

Chapter 2: Information Security Concepts

1. Information Security Overview: Background and Current Scenario
2. Types of Attacks
3. Goals for Security
4. E-commerce Security
5. Computer Forensics
6. Steganography

Chapter 3: Security Threats and Vulnerabilities

1. Overview of Security threats
2. Weak / Strong Passwords and Password Cracking
3. Insecure Network connections
4. Malicious Code
5. Programming Bugs

6. Cyber crime and Cyber terrorism
7. Information Warfare and Surveillance

Chapter 4: Cryptography / Encryption

1. Introduction to Cryptography / Encryption
2. Digital Signatures
3. Public Key infrastructure
4. Applications of Cryptography
5. Tools and techniques of Cryptography

Module 2: Security Management

Chapter 1: Security Management Practices

1. Overview of Security Management
2. Information Classification Process
3. Security Policy
4. Risk Management
5. Security Procedures and Guidelines
6. Business Continuity and Disaster Recovery
7. Ethics and Best Practices

Chapter 2: Security Laws and Standards

1. Security Assurance
2. Security Laws
3. IPR

4. International Standards
5. Security Audit
6. SSE-CMM / COBIT etc

Module 3: Information and Network Security

Chapter 1: Access Control and Intrusion Detection

1. Overview of Identification and Authorization
2. Overview of IDS
3. Intrusion Detection Systems and Intrusion Prevention Systems

Chapter 2: Server Management and Firewalls

1. User Management
2. Overview of Firewalls
3. Types of Firewalls
4. DMZ and firewall features

Chapter 3: Security for VPN and Next Generation Technologies

1. VPN Security
2. Security in Multimedia Networks
3. Various Computing Platforms: HPC. Cluster and Computing Grids
4. Virtualization and Cloud Technology and Security

Module 4: System and Application Security

Chapter 1: Security Architectures and Models

1. Designing Secure Operating Systems
2. Controls to enforce security services
3. Information Security Models

Chapter 2: System Security

1. Desktop Security
2. email security: PGP and SMIME
3. Web Security: web authentication, SSL and SET
4. Database Security

Chapter 3: OS Security

1. OS Security Vulnerabilities, updates and patches
2. OS integrity checks
3. Anti-virus software
4. Configuring the OS for security
5. OS Security Vulnerabilities, updates and patches

Chapter 4: Wireless Networks and Security

1. Components of wireless networks
2. Security issues in wireless

Syllabus of S. Y. M. C. A. (Science)

2009-10

University Of Pune

Structure and Syllabus of MCA (Master of Computer Application) Under Science Faculty Course

(To be implemented from year 2008-2009)

- Course Structure: The entire course is a Three year, six semester course. For the first five semesters there will be six theory courses and one Lab course. The last semester will be Industrial training/ Institutional project.
- Eligibility: Any Science graduate with minimum 50% marks for open category and pass class for reserve category.
- Examination: Out of the six theory courses for each semester, two are Departmental courses, which are evaluated internally for 100 marks. The remaining 4 University courses are evaluated for 80 marks externally and for 20 marks internally.

  The lab courses for semester I, III and V are Departmental courses, evaluated internally for 100 marks. The lab courses for semester II and IV are University courses evaluated externally for 100 marks. Some lab courses have assignments and some lab courses are divided into project work and assignments and the break up is given below for each lab course.

  The Industrial Project will be graded. The grades are O, A+, A, B+, B, C+, C and D. D grade indicated failure.
- Standard of Passing: A student is expected to get minimum 40% marks for passing in a paper.

  For University papers he must get at least 32 out of 80 (external) and at least 40 out of 100 (internal + external).

  For Departmental papers he must get at least 40 out of 100.
- ATKT Rules: For admission to second year, At least four (4) first year University Papers excluding Lab course should be clear.

  For admission to the third year, first year should be clear. (Both University papers and Departmental Papers) and at least four (4) second year University Papers excluding Lab course should be clear.

Structure of MCA Syllabus

SEMESTER I	
CS 101	C-Programming
CS-102	Computer Architecture
CS-103	Mathematical Foundation
CS-104	Business Communication (Departmental)
CS-105	Graph Theory
CS-106	Elective I (Departmental) 1. Problem Solving Techniques 2. Numerical Methods. 3. Multimedia
CS-107	General Laboratory I (Departmental) (Assignments in C-Programming)
SEMESTER II	
CS-201	Data and File Structures using C
CS-202	Theoretical Computer Science
CS-203	Object Oriented Programming (C^{++} Programming)
CS-204	Software Engineering (Departmental)
CS-205	Database Management Systems
CS-206	Elective-II (Departmental) 1. E-Commerce 2. Operations Research 3. Accounts and Financial Management.
CS-207	General Laboratory II (University) (Assignments in Data Structures, Databases and C^{++})
SEMESTER III	
CS-301	Design and Analysis of Algorithm
CS-302	Computer Networks
CS-303	Introduction to System Programming and Operating System Concepts
CS-304	Core Java (Departmental)
CS-305	Event Driven Programming (Win32 SDK)
CS-306	Elective III (Departmental) 1. Cyber Law 2. Artificial Intelligence 3. Computer Graphics. 4. System Administration I
CS-307	General Laboratory III (Departmental) (Assignments in O.S. and SDK and a project in C++ using any concept from TCS, DAA, DBMS, Networks) (50 marks Assignments and 50 marks Project)

SEMESTER IV	
CS-401	Introduction to UNIX and UNIX Internals
CS-402	Advanced Networking and Mobile Computing
CS-403	Distributed Database System
CS-404	Advanced Java (Departmental)
CS-405	Object Oriented Software Engineering
CS-406	Elective IV (Departmental) 1. Modeling and Simulation 2. Embedded Systems. 3. MFC 4. System Administration II 5. Database Administration I
CS-407	General Laboratory IV (University) (Assignments on Unix and Advanced Java and a project in SDK) (50 marks Assignments and 50 marks Project)
SEMESTER V	
CS-501	Cryptography and Network Security
CS-502	Internet Programming.
CS0503	Design Patterns
CS-504	Data Warehousing and Mining (Departmental)
CS-505	Software Testing and Quality Assurance.
CS-506	Elective V- (Departmental) 1. Current Trends and Technology 2. Expert System 3. Foreign Language 4. System Administration III 5. Database Administration II
CS-507	General Laboratory (Departmental) (Assignments on Internet Programming and a project in Java/MFC) (50 marks Assignments and 50 marks Project)
SEMESTER VI	
CS-601	Full Time Industrial Experience (University)

Syllabus for MCA(Under Science Faculty)Part II

CS – 301 Design and Analysis of Algorithms

Total Lectures = 52

Chapter No	Name of Topic	Total No of lectures	References
1	Introduction • Algorithm & Characteristics • Time & Space Complexity • Asymptotic Notations (O,Ω,Θ) • Sorting Algorithm examples and time complexity • Insertion Sort • Heap Sort • Counting Sort • Searching Algorithm Linear Search Iterative Binary Search • Fibonacci & Factorial Using Recursion	8	Book 1 Book 1 Book 1 Book 2 Book1 Book1
2	Divide and Conquer • Control Abstraction • Binary Search(recursive) • Quick Sort (Examples and time complexity) • Merge sort (Examples and time complexity) • Strassen's Matrix Multiplication	7	 Book 1
3	Greedy Method • Control abstraction • Knapsack problem • Job Sequencing with deadlines • Minimum Cost Spanning Tree Prim's Algorithm & Problems Kruskal's Algorithm & Problems • Optimal Merge patterns • Huffman code	8	Book 1 Book2
4	Dynamic Programming • The General Method • 0/1 Knapsack Problem Merge & Purge • All Pairs Shortest Path • Single Source shortest Path • String editing	10	Book 1 Book1

5	• Backtracking • General method • 8 Queens, 'n' Queens • Sum of Subsets (Fixed and variable tuple formulation) • Graph Coloring	6	Book 1
6	Branch & Bound • Introduction • Method • LCBB Search • Bounding Function • FIFO BB Search Problems on the following using LCBB • Traveling Salesman problem Using variable tuple Formulation.	6	Book 1
7	Graph Algorithms Elementary Graph Algorithms • Representations of Graph • DFS & BFS • Topological sort • Strongly Connected Component • Biconnected Component & DFS Single Source Shortest Path • Dijkstra's Algorithm & Problem Maximum Flow • Flow Network • Ford-Fulkerson Method & Problems Maximum Bipartite Matching	6	Book 2 Book1 Book 1 Book 2
8	NP-Hard & NP Complete Problems • Basic Concepts	1	Book 1

Reference Books

Book 1- Fundamentals of Computer Algorithms
Authors - Ellis Horowitz, Sartaz Sahani
Sanguthevar Rajsekaran
Publication :- Galgotia Publications

Book 2 – Introduction to Algorithms (second edition)
Authors :- Thomas Cormen
Charles E Leiserson, Ronald L.Rivest
Clifford Stein
Publication :- PHI Publication

CS-302: Computer Networks

Total Lectures: 48

Ch. No		Total Lectures	Reference Books
1	**Introduction to Computer Networks (Lectures: 9)**		
	Data Communication • characteristics of data communication, components, data representation, data flow	1	FORO. Ch. 1
	Computer Networks • goals and applications	1	TAN. Ch. 1
	Network Hardware • broadcast and point-to-point	1	TAN. Ch. 1
	Network Topologies • mesh, star, bus, ring, hybrid	1	FORO. Ch. 1
	Network Types • LAN, MAN, WAN, Wireless Networks, Home Networks, Internet works, • Protocols and Standards – Definition of Protocol, Defacto and Dejure standard	2	TAN. Ch. 1
	Network Software • Protocol Hierarchies - • layers, protocols, peers, interfaces, network architecture, protocol stack • design issues of the layers – addressing, error control, flow control, multiplexing and de-multiplexing, routing • Connection-oriented and connectionless service • Service Primitives – listen, connect, receive, send, disconnect • The relationships of services to protocol	3	TAN. Ch. 1
2	**Network Models (Lectures: 5)**		
	OSI Reference Model • Functionality of each layer	2	FORO. Ch2
	TCP/IP Reference Model • Introduction to IP, TCP, and UDP TCP/IP Protocol Suite	1	FORO. Ch2
	Comparison of OSI and TCP/IP model	1	FORO. Ch2
	Addressing • Physical, Logical and Port addresses	1	FORO. Ch2

3	**The Physical Layer (Lectures: 8)**		
	Basic Concepts • Bit rate, bit length, base band transmission • Transmission Impairments – attenuation, distortion and noise • Data Rate Limits – Nyquist's bit rate formula for noiseless channel and Shannon's law • Problems on above concepts	2	FORO. Ch3
	Performance of the Network • Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter • Problems on above concepts	1	FORO. Ch3
	Line Coding • Characteristics, Line Coding Schemes – Unipolar, NRZ, RZ, Manchester and Differential Manchester	1	FORO Ch.4
	Transmission Modes • Parallel Transmission • Serial Transmission – Asynchronous and Synchronous	1	FORO. Ch4
	Transmission Media • Guided Media – Twisted Pair, Coaxial Cable, Fiber Optic Cable • Unguided Media – Radio waves, microwaves, Infrared	2	FORO. Ch7.
	Switching • Circuit Switching, Message Switching and Packet Switching	1	TAN. Ch2
4	**The Data Link Layer (Lectures:6)**		
	Framing • Character Count, Byte Stuffing, Bit Stuffing and Physical Layer Coding Violations	1	TAN Ch3
	Error Control • Hamming Code and CRC	1	TAN Ch3.
	Flow Control • Stop and Wait ARQ for noisy channel	1	TAN Ch3
	Sliding Window Protocols • 1-bit sliding window protocols, Pipelining – Go-Back N and Selective Repeat	3	TAN Ch3.

5	**The Medium Access Sub layer (Lectures:5)**		
	Random Access Protocols • ALOHA – pure and slotted • CSMA – 1-persistent, p-persistent and non-persistent • CSMA/CD • CSMA/CA	2	FORO. Ch12
	Controlled Access • Reservation, Polling and Token Passing	1	FORO. Ch12
	Channelization • FDMA, TDMA and CDMA	2	FORO. Ch.12
6	**Wired LANS (Lectures:5)**		
	Ethernet Standard • Frame Format, Access Method and Physical Layer • Changes In The Standard – Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet • Fast Ethernet – Goals and MAC Sub layer Specifications • Gigabit Ethernet – goals, MAC Sub layer Specifications	4	FORO. Ch.13
	VLANS • Membership, Configuration and Advantages	1	FORO. Ch.15
7.	**The Network Layer (Lectures:10)**		
	Design Issues • Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram	2	TAN. Ch.5
	Logical Addressing • IPV4 Addresses – Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation(NAT) • IPV6 Addresses – Addressing Structure, Address Space	2	FORO. Ch. 19
	IPV4 Protocol • Datagram Format, Fragmentation, Checksum, Options	2	FORO. Ch. 20
	IPV6 Protocol • Advantages, Packet Format, Extension Headers	1	FORO. Ch. 20

	Transition From IPV4 to IPV6 • Dual Stack, Tunneling, Header Translation	1	FORO. Ch. 20
	Routing • Properties of routing algorithm, Comparison of Adaptive and Non-Adaptive Routing Algorithms	1	TAN. Ch. 5
	Congestion Control • General Principles of Congestion Control, Congestion Prevention Policies	1	TAN. Ch. 5

Reference Books:
Computer Networks by Andrew Tanenbaum, Pearson Education.
Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.

NOTE:
1) Only conceptual questions should be asked in examination on frame and packet format. Don't ask for entire frame or packet format.

CS-303: Introduction to System Programming and Operating System Concepts

Total lectures : 50

Chapter No.	Name of topic in Chapter	Total No. of lectures	Ref. Book & Page Nos.
1	**Introduction to System Program** • Introduction (Types and comparison of types of software) • Components of System Programming (Definitions only) • Assemblers • Loaders • Macros • Compilers and Interpreters • Editors • Debuggers	3	
2	**Introduction to Operating System** • Definition of operating system • Services provided by OS • Types of OS (Definitions only) • Early System • Mainframe System • Desktop System • System Calls : definition , implementation • Types of System Calls • Process or job control • Device Management • File Management • Information Maintenance • Communication • System call implementation • System Program	4	B3 → pg. 3 B3 → pg. 61 B3 → pg. 7 - 21 B3 → pg. 63 onwards
3	**Process Management** • Introduction and definition of process • Process state transition • Process Control Block • Process Scheduling • Scheduling queues • Types of schedulers • Long Term Schedulers • Middle Term Schedulers • Short Term Schedulers • IO Scheduler	4	B3 → Chapter 4 pg. 95 onwards

	• Context Switch		
4	**Threads** • Multithreading • Threading Issues • P Threads, Solaris – 2, Windows 2000, Linux, Java Threads : Introduction only, no coding)	2	B3 → Chapter 5
5	**CPU Scheduling** • Introduction • Scheduling Concepts • CPU- I/O Burst Cycle • CPU Scheduler • Preemptive and Non-preemptive scheduling • Dispatcher • Scheduling criteria (terminologies used in scheduling) • CPU Utilization • Throughput • Turnaround time • Waiting time • Response time • Scheduling Algorithms • FCFS • SJF (Preemptive & non-preemptive) • Priority Scheduling (Preemptive & non-preemptive) • Round Robin Scheduling • Multilevel Queues • Multilevel Feedback queues • Examples on scheduling algorithms	8	B3 → chapter 6 B3 → Pg. 73
6	**Process Synchronization** • Introduction • Critical section problem • Semaphores • Concept • Implementation • Deadlock & Starvation • Binary Semaphores • Problems of synchronization • Bounded buffer problem • Readers & writers problem • Dining Philosophers problem • Critical Sections • Monitors	6	(B3) →

7	**Deadlocks** • Introduction • Deadlock Characterization • Necessary Condition • Resource allocation graph • Examples • Handling Deadlock • Deadlock Prevention • Mutual Exclusion • Hold & wait • No preemption • Circular wait • Deadlock Avoidance • Safe State • Resource allocation graph algorithm • Bankers algorithm • Examples • Deadlock Detection • Single instance of each resource type • Several instances of a resource type • Detection algorithm usage • Recovery from deadlock • Process Termination • Resource Preemption	7	(B3) → Chapter 8
8	**Memory Management** • Introduction to memory management • Problems with memory management • Logical vs. physical addresses • Dynamic vs. static linking • Overlays (Ref from Ch. 5, Examples only) • Resident monitor • Swapping • Contiguous memory allocation (No Problems, only concept) • Single contiguous memory management module • Multiple contiguous memory management module • Non-contiguous memory allocation (No Problems, only concept) • Paging • Segmentation • Segmentation with paging • Virtual memory • Demand paging • Page replacement algorithms	8	B3 → chapter 9 (B3) → chapter 10

	• FIFO • MRU • LRU • LRU approximation using reference bit • MFU • LFU • Second Chance algorithm • Optimal replacement • Examples on Page replacement algorithm. • Allocation algorithms with minimum no. of frames		Pg. 320
9	**File System** • Introduction & File concepts (file attributes, operations on files) • Access methods • Sequential access • Direct access • Indexed access • File structure • File system mounting and sharing • Allocation methods • Contiguous allocation • Linked Allocation • Indexed Allocation • Free space management • Bit map or bit vector • Linked list • Grouping • Counting • File protection	5	(B3) → chapter 11 Pg. 372 (B3) → chapter 12 Pg. 421
10	**Device Management & I/O System** • Introduction and I/O Hardware • Interrupt (Maskable and non maskable) • Kernel I/O Subsystem • I/O Scheduling • Buffering • Caching • Spooling and device Reservation • Error Handling • Kernel Data Structures • Disk Scheduling • First Come First Served FCFS • Shortest seek time first (SSTF) • Scan • C-Scan • LOOK	3	(B3) → Chapter 13 Pg. 456 (B3) → Chapter 14

	• C-LOOK • Examples on Disk scheduling		Pg. 493

Reference Books :
System Programming and Operating System – D. M. Dhamdhere (B1)
System Software – An introduction to systems programming – Leland L. Beck (Pearson Edition) (B2)
Operating System Concepts – Silberschatz, Galvin, Gagne (B3)

Lab Assignments :
Simulation of
Banker's Algorithm
CPU Scheduling algorithms
FCFS, SJF (Preemptive, Non-preemptive), RR, Priority (Preemptive, Non-preemptive)
Page Replacement algorithms
FIFO, MRU, LRU, MFU, LFU
Disk Scheduling algorithms
FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK

CS-304: Core Java (Departmental)

Total Lectures: 48

Sr.No	Chapter	Book	Chapter in the book	No. of lectures
1	Introduction of Java Programming • Overview of Java platform • Brief History of Java • Technology • Java tools • Java Byte Code • Object Oriented • Programming Principles • Comparison between C++ and Java	1 2	1,2 1	2
2	Elementary Programming Concepts • Variables & Identifiers • Java keywords • Data types • Operators • Expression • Constants • Statements • Arrays • First Java Program	1 2	2,3,4,5 2,3	3
3	Classes & Packages • Introduction and Defining • Classes, methods, fields • Initializing fields • Static members • Constructors and Finalizers referencing objects • Using packages & Sub packages, • Access specifies	1 2	6,7,9 4	4
4	Inheritance, nested and inner class • Extending classes • Abstract class • Interface • Super keyword • Final keyword • Final classes • Constructors & Inheritance • Dynamic Binding • Overloading and Overriding methods	1 2	8, 5,9	4
5	String Handling & Exploring java.lang • String and String Buffer class • String Operations • Character Extractions • Data Conversion • Modifying strings	1	13, 14	3

Sr.No	Chapter	Book	Chapter	No. of lectures
6	Exception Handling and Input and Output package (java.io. package) • Introduction to exception • Try and catch block, throw, throws and finally block • Inbuilt exceptions • User-defined exceptions • Byte streams • Character streams • File IO basics Object serialization – reader and writer	1 2 4	10, 17 6,8	7
7	AWT, Event Handling and Applet programming • Layout Manager Layout • Manager, AWT Controls, Various Events and Listeners ,Adapter classes ,Applet fundamentals, Applet lifecycle, Creating and running applets, advantages and restrictions	1	19,20,21 ,22	10
8	Swings • Swing Features, Model View Controller Architecture for swings • Swing Controls • Component Organizers • JApplet , JFrame, JButton,JcheckBox, JtextField, JtabbedPane, JinternalFrame , JscrollPane, JLabel, JList, JTrees, JTables, JDialog, File chooser, Color chooser ,Menu Handling.	5	6	10
9	Multithreading • What are Threads, Life cycle of threads, • Running Multiple threads • The Runnable interface • Threads priorities Daemon, • Thread states, thread groups Synchronization and Interthread Communication Deadlocks	5 1	1 11	5

NOTE :
80 marks theory and 20 marks Lab assignments to be evaluated internally.

Reference: 1) The Complete Reference java 2 by Herbert Schildt. Tata Mc. Graw Hill
2) Java Programming Advanced topics by Joe Wigglesworth – Paula Lumby. Thomson Learning
3)Programming in java 2 by R. Raja Ram. SciTech Publications India Pvt. Ltd.
4) Core Java I - By Cay S. Horstmann and Gary Cornell
5) Core Java II - By Cay S. Horstmann and Gary Cornell

CS-305-Event Driven Programming (Win 32 SDK)

Total lectures: 47

Chapter No	Chapter Name	No of Lectures	Book	Page No
1	Overview Of Windows Programming • Brief history of windows • The use's perspective • GUI • Consistent user interface • Multitasking advantage • Memory management • Device independent graphics interface • Traditional MS-DOS program model & window program model • Programming in Dos vs programming in windows • Win 32 API • Object –Oriented programming • Message driven architecture	2	B2	20 to 38
2	First Windows Application • Hungarian Notation • Structure of windows application • First windows program["The hello program] • Winmain() • Registering the window class • Creating the window • Displaying the window • Message loop • Window procedure • Processing the messages • Queued & nonqueued messages • Non-preemptive multitasking& preemptive multitasking	2	B1	41 to 66

3	The WM-Paint Message • Painting with text • The WM-Paint message • Valid & Invalid Rectangles • An introduction of GDI • The device Context(DC) • Getting DC-method1 • Getting DC-method2 • Release DC() • Windows RGB()macro	4	B1	71 to end of chapter
4	• Reading Input • The keyboard • Keyboard driver • Keystrokes & characters • Keystrokes message • The lparam variable • Virtual key codes (wparam variable) • Shift states • Character messages • The caret • Working with character set • The mouse • Mouse basics • Client area mouse messages • Processing shift keys • Mouse double keys • Non client area mouse messages • The hit-test message • Changing the mouse curser • Capturing the mouse • Timer basics • Using timer [method 1,2,3]	4	B1	211 & 273 to end of chapter
5	Window Controls • Child window controls • Button • Static • Edit • List Box • Scroll Bar • Combo ox • Creating common controls	4	B1	357 to end of chapter

	• Sending messages to common controls • Notification messages from controls • Creating a toolbar • Creating a status bar • Property sheets • Creating property sheets			
6	Resources • Icons • Getting a handle on icons • Using icons in your program • Cursor • Using alternate cursors • Moving cursor with the keyboard • Bitmaps • Character String Menus & Accelerators • Menu Structure • Menu template • Referencing the menu in your program • Menu & messages • Defining a menu dynamically • Floating popup menus • Changing the menu • Using bitmap in menu • Using system menu • Accelerators • Keyboard Accelerators • Accelerator table	4	B1	417 to end of chapter

7	Dialog Boxes • Introduction • Model Dialog boxes • Dialog box template • Dialog box procedure • Message boxes • Models Dialog boxes • Difference between model & models dialog box	4	B1	483 to end of chapter
8	GDI • The device context • Getting handle to the device context • The device context attributes • Saving device context • Mapping mode • Device co-ordinate systems	3	B1	71 to end of chapter
9	Drawing Graphics & Bitmaps • Drawing points • Drawin`g lines • Creating, Selecting& Deleting pens • Filling in the Gaps • Drawing modes • Drawing filled areas • Bounding box • Polygon function & polygon filling mode • Brushing the interior • Brushes & bitmaps • Brush alignment • Rectangles • Regions • Bitmaps • Device independent bitmap(DIB) • The DIB file • Displaying a DIB • Creating a DIB • GUI Bitmap object • Bitmap Format • Getting bitmap on the display	4	B1	641&723 to end of chapter

10	Meta Files & Fonts • Meta files • Memory meta files • Disk meta files • Enhanced metafiles • What meta files can do & cannot do • Text • Simple text drawing function • Device context attributes for text • Using stock fonts • Graying character string • Fonts • Types of fonts • Defining a logical font • Creating, selecting & deleting logical fonts • Enumerating the fonts	3	B1	997&1097 to end of chapter
11	Data Exchanges & Link • Clipboard • Clipboard function • Copying text to the clipboard • Pasting text from the clipboard • Pasting bitmap clipboard • Clipboard viewer • Clipment views chain function & messages • Dynamic data exchange • Clipboard transfers • Dynamic link libraries • Dynamic data exchange • The type of conversations	3	B1	5 67 &1243 to end of chapter
12	MDI • The elements of MDI • Initializing a MDI application • Creating the windows • Writing the main message loop • Writing the frame window procedure • Writing the child window procedure • Associating data with child windows	3	B1	1173 to end of chapter

13	Memory Management • Processes & memory space • Virtual address space • Heaps	1	B1	
14	Dynamic Link Libraries (DLL) • Creating a DLL • Implicit Linking • Explicit Linking • DLL entry/exit function	2	B1	1243
15	Multitasking & Multithreading • Modes of multitasking • Non-preemptive multitasking • Preemptive multitasking • Threads • Thread object • Attributes of threads • Multithreaded Architecture • Create thread function • Terminate thread function • Exit thread function • Thread synchronization • Critical section • Mutex object • Event object	2	B1	1197
16	ODBC • ODBC standards • ODBC elements • Environment ,connection & statement • ODBC Administration • SQL statement processing in ODBC	2	B3	Chapter2

Reference Books:
B1)Programming windows by Charles Petzold
B2)Windows programming primer plus by Jim conger.
B3)Microsoft ODBC programmer reference guide.

CS-306 Cyber Law
Elective III (Departmental)

Total Lectures: 48

Ch.No	Chapter Name and Details	Page number & Reference Book	No. of Lectures
1.	**Introduction to Cyber Law** • Definition, • Objectives of Cyber Law • Scope • Introduction to IT Act 2000 • Features of IT act 2000	Book 1 Page no 324 to 325, page 477	2
2.	**Cyber Crime in the Information age** • Concept of Cyber crime • Crimes on the net • Hacking(introduction) • Software Piracy • Cyber stalking • Virus on the internet • Defamation, Harassment & email abuse • Cyber Pornography • Monetary Penalties, adjudication and appeal under IT Act 2000	Book 1 Page 54,55 page 92,112,113 Page 67 Book 2 page 69 Page88	10
3.	**Intellectual Property Rights and Cyber Law** • Introduction • Objects of copyright • Requirement and Meaning of copyright • Copyright as bundle of rights • Framing • Linking & infringement • Information Technology act related to copyright and Acts which are not infringement of • Music & copyright infringement • Moral rights and internet prospective on intellectual property rights • Domain name Disputes	page183 page 147 to 173	8

4.	**Hacking – unauthorized Access to computer Material** • Introduction • Problem of hacking & basic hacking offence • Hackers • Kinds of hacker • Five common methods of attack • Destruction of digital information • Worms • Jurisdiction issues of hacking • Legislation in India		5
5.	**Security Aspects** • Encryption • Technical Aspects of Encryption • Encryption In crime and terrorism • Secret keys (password) • Firewalls • Role based Access control List • Steganography • Remote storage & audit disabling • Cellular phones & cloning • Terrorists get more tech-savvy	Page21 to 31 Page 37	8
6.	**Digital Signature** • How Digital Signature works(Asymmetric Cryptography & symmetric Cryptography)) • Creation and Verification of Digital signature • Certifying Authority to issue Digital signature • Controller of certifying Authorities • Refusal or renewal of license • Difference between handwritten signature and Digital signature	Page 229 to 242 Page 482	4
7.	**Cyber Law and Ecommerce** • Introduction to Ecommerce • The technical & economic context • Types of Ecommerce • Legal issues • Benefits and disadvantages of E-commerce • E-banking • Risk of Ecommerce • Cyber law & Ecommerce	Page 206 to 210	4
8.	**Defective Hardware or software** • Product liability • Negligence • Contractual liability • Development risk defense • Criminal Liability caused by computer defect	Page 443 to 452	3

9.	**Electronic Governance** • Legal Recognition of electronic records • Legal recognition of digital signatures • Use of electronic records and digital signatures in Government and its agencies • Retention of Electronic records • E-Gazette • 9.6 Attribution Acknowledgment & dispatch of electronic records	Page 483 to 486	2
10	**New Horizon in field of Information Technology by year 2020** • The death of distance • Improved connections • Increased mobility • More competition • Loss of privacy • Openness as Strategy • The rise of English • Global peace	Page 422 to 425	2

Reference Books:

1) Cyber Laws Dr Gupta & Agrawal , Premier publishing Company
2) Cyber Law simplified – Vivek Sood ,Tata MaGraw-Hill
3) Nature of Cyber Laws S.R. Sharma , Anmol Publications
4) Dimensions of Cyber Crime S.R. Sharma, Anmol Publications
5) Computer Forensics & Cyber Crimes Marjie Britz (pearson)

CS-306: Artificial Intelligence
Elective III (Departmental)

Total Lectures: 48

Chapter No.	Name of Topic	No. of Lectures	Reference Book
1	**Introduction to Artificial Intelligence** • What is AI? • Early work in AI • AI and related fields • AI problems and Techniques	2	Book 1(Pg 3) & Book 2 (Pg 1) Book 2 (Pg 5) Book 2 (Pg 7) Book 1 (Pg 8)
2	**Problems, Problem Spaces and Search** • Defining AI problems as a State Space Search: example • Production Systems • Search and Control Strategies • Problem Characteristics • Issues in Design of Search Programs • Additional Problems	4	Book 1 (Pg 29–61)
3	**Heuristic Search Techniques** • Generate-and-test • Hill Climbing • Best First Search • Problem Reduction • Constraint Satisfaction • Mean-Ends Analysis	6	Book 1 (Pg 63–97)
4	**Knowledge Representation** • Representations and Mappings • Approaches to Knowledge Representation • Knowledge representation method • Propositional Logic • Predicate logic • Representing Simple facts in Logic • Representing Instances and Isa relationships • Computable Functions and Predicates • Resolution • Forward and backward chaining	12	Book 1 (Pg 105–115) Book 1 (pg 131–164) Book 1 (Pg 177)
5	**Slot – and – Filler Structures** • Weak Structures • Semantic Networks • Frames • Strong Structures	7	Book 1 (Pg 251–275) Book 1 (Pg 277–295)

	• Conceptual Dependencies • Scripts		
6	**Game Playing** • Minimax Search Procedures • Adding alpha-beta cutoffs	2	Book 1 (Pg 310–314)
7	**Planning** • An example Domain: The Blocks world • Component of a planning system • Goal state planning • Nonlinear planning • Hierarchical Planning	4	Book 1 (Pg 329-356)
8	**Natural Language Processing** • Introduction • Syntactic Processing • Semantic analysis • Discourse and Pragmatic Processing	2	Book 1(pg 377-415)
7	**Learning** • What is learning • Rote Learning • Learning by taking advice • Learning in problem solving • Learning from examples • Explanation based learning	3	Book 1 (Pg447–471)
8	**Introduction to AI Programming Language** • PROLOG • Introduction to TURBO PROLOG • PROLOG variables • Simple Input and Output • Basic Rules of Recursion • Arithmetic Operations	6	Book 3 (Pg 1-23) Book 3 (Pg 45-52) Book 3 (Pg 70-78) Book 3 (Pg 96-100) Book 3 (Pg 115-127)

Note:
80 marks theory and 20 marks Lab assignments to be evaluated internally.

Reference Books:

Artificial Intelligence, Tata McGraw Hill, 2nd Edition, by Elaine Rich and Kevin Knight
Introduction to Artificial Intelligence and Expert System, Prentice Hall of India Pvt. Ltd., New Delhi, 1997, 2nd Printing, by Dan Patterson.
Introduction to TURBO PROLOG, BPB Publication, by Carl Townsend

CS-306 Computer Graphics
Elective III (Departmental)

Total Lectures: 48

Chapter No.	Name of Topics in Chapters	No. of lectures	Reference book and Chapter no.
1	**Introduction to Graphics :** • Advantages of Computer Graphics • Applications of Computer Graphics • Raster scan Display Devices • CRT Introduction to Pixels Frame Buffers • Direct View Storage Tube • Flat Panel Display • Emissive Display • Non Emissive Display • LCD • Input Devices Keyboard , mouse, track ball , Space ball, joy stick , Digitizer , Image scanner , touch panel and light pen. • Random Scan • Aliasing & anti-aliasing	3 lectures	R2: Chap 1 R4 : chap2
2	**Line Generation and Area Filling :** Line Generation Algorithm • Digital Differential Analyzer (DDA) algorithm • Bresenham's Line Generation Algorithm • Mid-Point Algorithm • Rubber band technique Polygon Filling • Scan Line Algorithm • Flood Fill Algorithm • Boundary Fill Algorithm • 4-Connected Polygon • 8- Connected Polygon • Inside Outside Test Circle Generation Algorithm : • Properties of circle • DDA Algo. • Bresenham's Algorithm • Mid Point Algorithm	6	R4: Chap 3 Section 3.1 to 3.7 R2 : Chap 3 section 3-1, 3-2, 3-5, 3-11.

3.	**2D Transformation :** • Homogenous Coordinates • Translation and Scaling • Shearing • Rotation about an arbitrary point • Rotation about origin • Reflection with respect to coordinate Axis • Reflection with respect to any arbitrary point • Reflection with respect to arbitrary line • Composite Transformation	7	R2, chapter 5 R4: chapter 4
4	**Viewing and Line Clipping Algorithms :** Window to View port Transformation • Clipping in 2D • Point Clipping • Clip window • Line Clipping Cohen – Sutherland line clipping Algorithm • Polygon Clipping • Sutherland- Hodgeman • Text Clipping • Bit- Map Graphics	5	R4: chapter 6 R2: chapter 6 Section 6-1 to 6-8. R3 :Page no. 156 R3 : Page no. 59
5.	**3D Viewing and Projections :** • Parallel Projections • Orthographic • Cavalier Oblique and Cabinet Oblique • Isometric • Perspective Projections • Transformation matrices • General parallel projection • Oblique projection • Perspective Projection • (single point) • Vanishing Points • 1-point and 2-point vanishing points • Principal vanishing Point • (no problem on two point vanishing point) *** Prerequisite : All 3D plane transformation (translation , rotation , scaling , reflection) should be covered in 2 lecture	8	R4 : chapter 7 R2: chapter 9 Section 9-1 Chapter 12; Section 12-1 to 12-4

6.	**Hidden surface elimination** • Hidden Surface Algorithms • Depth –Buffer • (Z buffer) Method • Scan-line Method • Depth Sorting Method Area Subdivision Method	6	R2 : Chapter 13 R4 : Chapter 8
7	**Light Color and Shading :** • Diffuse Illumination • Point- source Illumination • Shading Algorithm • Phong Shading • Halftone Shading • Gourand Shading • Constant intensity Shading • Ray Tracing • Ray Surface Intersection Calculation • Reducing Object- Intersection Calculation • Antialiased Ray Tracing • Refraction of light • Achromatic Light • Color Models • RGB , CMY , HSV and HLS color models • Colorimetry • Perceived color	8	R4 : chapter 9 R3 : page 294
8	**Computer Animation :** • Design of Animation sequences • Raster Animation • Key-Frame Systems • Motion Specifications	5	R2 : Chapter 16

NOTE :
80 marks theory and 20 marks Lab assignments to be evaluated internally.
References :

R1: **Computer Graphics: Principles and Practice**, J. Foley, A.van Dam, S. Feiner, J.Hughes, Addison Wesley Pub., 1997
R2: **Computer Graphics, D. Hearn, M. P.Baker**, Prentice Hall, 1997
R3: **Computer Graphics and geometric Modelling implementation and algorithm,** Max . K. Agoston
R4: **Computer Graphics , A.P .Godse**

MCA

CS- 306 (System Administration- I) Elective Departmental

Semester-III

Total Lectures 48

1. **Network Administration** [4]
   - What is network administration
   - Study of LAN component: File Server, Workstation, Types of Cables,- Cat5 Cable and Cat6 Cable Structure, connectors, Types of switches – Managed and Unmanaged, NIC, IEE802.3 Ethernet- traditional, fast and gigabit, Gateways- types, Routers – Wired and Wireless
   - Physical Setup of LAN- selection of cables, cabling types: crossover cable and straight through. Concept of color codes, Crimping tools
   - Managing Resources- h/w resources, disk quota, files and directories, software installation/upgrades, email application, network printing.
2. **Managing Network Performance** [4]
   - Potential network performance problems: physical layer issues, network traffic, address resolution problems, internetworking issues.
   - Tools and techniques- ping, trace route, network analyzer, h/w troubleshooting
3. **Protecting the Network** [6]
   - Ensuring data integrity
   - Protecting user data
   - Firewalls
   - Diskless workstation
   - Encryption
   - Virus shields
   - RAID
4. **Troubleshooting and Preventing Problems** [4]
   - Logical fault isolation – ADJUST method.
   - Common Networking Problems
   - Tools for gathering information
5. **Installing, Administering, and Configuring MS Windows XP Professional** [6]
   - Installation of Windows XP Professional - devices drivers - boot process-desktop settings – security settings - networking Settings

6. **Managing and Maintaining a MS Windows Server 2003 Environment** [8]
   - Installing Windows Server 2003
   - Create & Populate - Organizational units user computer accounts - Groups - Access to resources - printing - Implement Group Policy - hard disks data storage - Disaster recovery - Device drivers- Audit accounts and resources - Monitor system performance - Maintain software update by using Microsoft SUS.

7. **Implementing a MS Windows Server 2003 Network Infrastructure** [16]
   - *Network Hosts (i)*
     TCP/IP architecture - IP addressing - Calculate a subnet mask - subnets - VLSM - CIDR - Static IP -Dynamic IP - IP routing process - name servers - Isolate common connectivity issues.
   - *Network Services (ii)*
     Install, configure and manage Routing and Remote Access Service (RRAS) - Dynamic Host Configuration Protocol (DHCP) - Windows Internet Name Service (WINS) - Domain Name System (DNS)- IP Security (IPSec) - Virtual Private Network (VPN) - dial-up Client - Wireless Lan (WLAN) Client.

Reference:

1. Computer Networks BY- Andrew Tanenbaum 4th Edition EEE
2. Data Communication and Networking By- Behrouz Forouzan 3rd Edition TMH
3. Complete Guide to Networking By- Peter Norton Techmedia
4. Microsoft Windows Server 2003 Administrator's Companion
   Charlie Russel, Sharon Crawford, Jason Geren- PHI
5 Microsoft® Windows Server™ 2003 by Microsoft Press

CS-401 Introduction to UNIX and UNIX Internals

Total Lectures : 48

Chapter No.	Name of topic in chapter in Chapter	Total No. of lectures	Ref. Book & Page Nos.
1	**Introduction to UNIX OS** • Features of UNIX • UNIX System Organization • Operating System Services • Assumption about Hardware • UNIX / Linux Commands • Redirection and Pipe	3	B2 B2 B1 → Ch. 1.4 B1 → Ch. 1.5 B3 B2& B3
2	**Shell Programming** • Shell and Types of Shell • Shell commands • Environment Variables & Shell Meta characters • Operators & Statements used in shell script (Decision, Loop Control Statements) • File status statements • Examples of Shell Scripts	3	(B2) →
3	**Overview of a System** • Architecture of UNIX Operating System • Introduction to System Concept • Kernel Data Structure • System Administration	2	(B1) → Chapter 2
4	**The Buffer Cache** • Buffer Header • Structure of Buffer Pool • Buffer Retrieval • Reading and writing disks blocks • Advantages and disadvantages	3	(B1) → Ch. 3
5	**Internal representation of files** • I-nodes • Structure of a regular file • Directories • Conversion of pathname to an inode • Super block • I-node assignment to a new file • Allocation of disk block	4	(B1) → Ch. 4
6	**System calls for the file system** • Open • Read	10	(B1) → Ch. 5

	• Write • File and record blocking • Adjusting the position of file I/O - lseek • Close • File creation • Creation of Special Files • Change directory and change root • Change owner and change mode • Stat and fstat • Pipes • Dup • Mounting and Unmounting file systems • Link • Unlink • File System Maintenance		
7	**The Structure of Process** • Process states and transitions • Layout of system memory • The context of a process • Saving the context of a process • Manipulation of a process address space • Sleep	6	(B1) → Ch 6.
8	**Process Control** • Process creation • Signals • Process termination • Awaiting process termination • Invoking other programs • The user-id of a process • Changing the size of a process • The shell • System boot and init process	10	(B1) → Ch. 7
9	**Process Scheduling and time** • Process scheduling • System calls for time • Clock	3	(B1) → Ch. 8
10	**Memory Management Policies** • Swapping • Demand paging • Hybrid system with swapping and demand paging	5	(B1) → Ch. 9

Reference Books :

The Design of the UNIX Operating System→ Maurice J. Bach (Pearson Education)
UNIX Shell Programming → Y. P. Kanetkar (BPB)
UNIX Concepts & Applications → Sumitabha Das (THM)
Advanced Programming in UNIX Environment → Richard Stevens (Pearson Education)
Vijay Mukhi's The C Odyssey UNIX The Open Boundless C→ Meeta Gandhi, Tilak Shetty, Rajiv Shah (BPB Publication)

NOTE: Questions on writing algorithms should not be asked in the University Examination.

CS-402: Advanced Networking and Mobile Computing

Total Lectures: 48

Ch. No		Total Lectures	Reference Books
1	**Introduction to Mobile Networks (Lectures: 9)**		
	Applications of Mobile Networks • Vehicles, Emergencies, Business, Replacement of Wired Networks, • Location Dependent Services	1	Schiller. Ch.1
	Wireless Transmission • Signal Propagation Effects – Path loss, Multi-path Propagation, multiplexing and modulation	2	Schiller.Ch.2
	Spread Spectrum • Direct Sequence and Frequency Hopping	2	Schiller.Ch.2
	Cellular Systems • Advantages and disadvantages, Cluster	1	Schiller.Ch.2
	MAC Layer Protocols • Problems with CSMA/CD – Hidden and Exposed terminal • SDMA,FDMA, TDMA – DAMA, Polling, ISMA CDMA	3	Schiller.Ch.3
2	**GSM (Lectures: 6)**		
	Mobile Services • Bearer, Tele Services and Supplementary Services	1	Schiller.Ch.4
	System Architecture • Radio Subsystem, Network and Switching Subsystem, and Operation Subsystem	2	Schiller.Ch.4
	Localization and Calling • MOC, MTC	1	Schiller.Ch.4
	Handover • Reasons for a handover, handover scenarios	1	Schiller.Ch.4
	GPRS • Architecture	1	Schiller.Ch.4
	Introduction to Generators • 1G, 2G, 2+G,3G		
3	**Wireless LAN (Lectures: 3)**		
	IEEE 802.11 • System Architecture, • MAC Sublayer – Distributed Coordination Function(DCF), • Point Coordination Function(PCF), Addressing Mechanism	2	FORO. Ch.14
	Bluetooth	1	FORO. Ch. 14

	• Architecture – piconet, scatternet • Radio Layer, Baseband Layer – TDMA and Physical Links		
4	**The Mobile Network Layer (Lectures:6)**		
	Mobile IP • Goals, Assumptions and Requirements, Entities and Terminology, IP Packet Delivery • Agent Discovery – Agent Advertisement, Agent Solicitation • Registration, Tunneling and Encapsulation – IP-in-IP, Minimal and Generic • Optimizations, Reverse Tunneling	4	Schiller. Ch.8
	Mobile Ad-Hoc Networks • Advantages, Routing Problems in Ad-hoc Networks	2	Schiller. Ch.8
5	**The Transport Layer (Lectures:10)**		
	Process-to-Process Delivery • Client Server Paradigm, • Multiplexing and De-multiplexing, • Connectionless Vs Connection-Oriented Service, • Reliable Vs Unreliable	1	FORO. Ch.23
	User Datagram Protocol UDP) • Datagram Format, Checksum, UDP operations, Use of UDP	1	FORO. Ch.23
	Transmission Control Protocol (TCP) • TCP Services, • TCP Features, • TCP Segment, • TCP Connection, • Flow Control, Error Control	2	FORO. Ch.23
	TCP Congestion Control • Slow Start Mechanism	1	FORO. Ch.24
	TCP in Mobile Environment • Improvements on TCP – • Indirect TCP, • Snooping TCP, • Mobile TCP, • Fast Retransmit/Fast Recovery, • Transmission/time-out Freezing, • Selective Retransmission, • Transaction-Oriented TCP	4	Schiller. Ch. 9
	Introduction to SCTP	1	FORO. Ch. 23

	• Comparison of UDP, TCP and SCTP • SCTP Services – • Process-to-Process Communication, • Multiple Streams, • Multihoming, • Full Duplex Communication, • Connection-Oriented Service, • Reliable Service		
6	**The Application Layer (Lectures:8)**		
	Domain Name System (DNS) • Name Space, • Domain Name Space, • Distribution of Name Space, • DNS in the Internet, Name – Address Resolution	1	FORO. Ch.25
	TELNET • Timesharing Environment, • Logging, NVT, Embedding, Options, • Mode of Operations	1	FORO. Ch.26
	E-MAIL • Architecture, • User Agent, • Message Transfer Agent-SMTP, • Message Access Agent-POP, IMAP, • Web Based Mail	3	FORO. Ch.26
	File Transfer Protocol (FTP) • Communication over control connection, • Communication over Data Connection, • Anonymous FTP	1	FORO. Ch. 26
	WWW • Architecture, • WEB Documents	1	FORO. Ch. 27
	HTTP • HTTP Transaction, • Persistent and Non-persistent Connection, • Proxy Server	1	FORO. Ch. 27
7.	**Internetworking Devices (Lectures:2)**		
	Physical Layer Devices • Repeaters, Hubs		FORO. Ch. 15
	Data Link Layer Devices • Bridges – Transparent and Source Routing Bridges, • Bridges Connecting Different LANs		FORO. Ch. 15
	Network Layer Devices • Routers		FORO. Ch. 15
	Gateways		FORO. Ch. 15

8.	**Wireless Application Protocol (WAP) (Lectures: 4)**		
	Architecture • WDP, WTLS, WTP, WSP, WAE,WTA, • Push Architecture	4	Schiller. Ch. 10

Reference Books:
Mobile Communications by Jochen Schiller, Pearson Education
Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.

NOTE:
1) Only conceptual questions should be asked in examination on frame and packet format. Don't ask for entire frame or packet format.

CS-403 Distributed Database System.

Total Lectures : 54

Name of the Topic	No of Lectures	Text Book Chap. No.
1. Introduction to DDBMS • Distributed Data Processing • Introduction to DDBS • Introduction to DDBMS • Promises of DDBMS • Complicating factors and problem areas in DDBMS	3	1
2. Distributed DBMS Architecture • DBMS Standardization • Architectural models of DDBMS • DDBMS architectures and global directory issues.	5	4
3. Distributed Database Design • Alternative design strategies • Distributed design issues • Fragmentation and allocation	8	5
4. Overview of Query Processing • Query Processing problems • Objectives of query processing • Complexity of relational algebraic operations • Characterization of query processing • Layers of query processing	4	7
5. Query Decomposition and Data Localization • Query decomposition • Localization of distributed data	6	8
6. Optimization of Distributed Queries • Query optimization • Centralized query optimization • Join ordering of fragmented queries • Distributed query optimization	8	9
7. Transaction Management • Definition of transaction • Problems of transaction • Types of transaction • Architecture revisited	2	10
8. Distributed Concurrency Control • Serilizability Theory • Taxonomy of concurrency control mechanisms • Locking based concurrency based protocols • Timestamp based concurrency based protocols	10	11

• Optimistic concurrency control • Deadlock management • Relaxed concurrency		
9. Distributed DBMS Reliability • Reliability concepts and measures • Failures & fault tolerance in distributed systems • Failures in DDBMS • Local reliability protocols • Distributed reliability protocols • Dealing with site failures • Network partitioning	8	12

Text Book : Principles of Distributed Database Systems; 2nd Edition
By M. Tamer Ozsu and Patrick Valduriez
Published by Person Education Asia
ISBN 81-7808-375-2

References : Distributed database principles
By Stefano Ceri and Giuseppo Pelagatti
Published by McGraw-Hill International Editions
ISBN 0-07-010829-3

CS-404 Advanced Java (Departmental)

Total Lectures : 52

Sr.No	Chapter	Book	Chapter in the book	No. of lectures
1	JDBC • The design of JDBC, • Basic JDBC programming concepts • Making the connection, Statement and Result set , Executing SQL commands , Executing Queries, Scrollable and Updatable Result Sets, • MetaData, • (Databases : Mysql/ SQL Server/ PostgreSQL/Oracle)	2	4	5
2	Collections Framework • Collection Interface, o List, Sets, • Sorted Set • Collection classes, • Linked List, • Array Lists • Vectors, • Hash Set, • Tree Set • Using Iterates and • Enumerators, • Working with Maps • Map Interface • Map classes	2 1	2 15	5
3	Networking • Networking Basics • Socket Overview, • Client/Server, • Reserved Sockets, • Proxy Servers, • Internet Addressing • Inet Address, • Factory methods • Instance methods • TCP/IP client socket, • URL, URL Connection, • TCP/IP Server sockets, Datagrams, • Developing small application with sockets	1 2	18 3	6

4	Servlets • What are Servlets?, Advantages of Servlet, • Lifecycle of servlet, • Using Tomcat for servlet development, • javax.servlet package, • The Servlet Interface • The ServletConfig • Interface • The ServletContext • Interface • ServletRequest • ServletResponse • SingleThread Model • GenericServlet Class • ServletInputStream • ServletOutputStream • ServletException • javax.servlet.http package, • HttpServletRequest, • HttpServletResponse • HttpSession • The Cookie class, • HttpServlet class • Handling HTTP Requests and Responses • GET requests • POST requests • Servlet - JDBC • Session Tracking, • Security Issues.	1	27	10
5.	Remote Method Invocation • Introduction to Remote Objects, • RMI architecture, • registry, • stubs and skeleton, • Setting up Remote Method Invocation, • Using RMI with Applets	2	5	5

Sr.No	Chapter	Book	Chapter	No. of lectures
6.	JavaBeans • What is Bean?, • Advantages • Using the Bean Development Kit (BDK) • Introduction to Jar and manifest files, • The Bean Writing process, • The Java Beans API	1	25	5
7.	Introduction to EJB • Introduction and purpose of Application Servers • Introduction to EI.			5
8	Introduction to JSP • Components of JSP – directives, tags and scripting elements. • Building a simple application using JSP	3	11	5
9	XML • An introduction to XML, • Parsing an XML Document, Using SAX Parser, Generating XML Documents,	2	12	6

NOTE : 80 marks theory and 20 marks practical assignments to be evaluated internally.

Reference:

1) The Complete Reference java 2 by Herbert Schildt. Tata Mc. Graw Hill 5th edition.

2)Core Java –II. By Cay S. Horstmann and Gary Cornell

3) Book Complete Reference J2EE by Jim Keogh

CS 405 : Object Oriented Software Engineering

Total Lectures : 50.

Chap No.	Chapter Name	No. of Lect.	Reference Book
1	Object Oriented Concepts and Modeling • What is Object Orientation? (Introduction to class, Object, inheritance, polymorphism) • Model & Domain Model • Importance of Modeling • Principles of Modeling • Object Oriented Modeling	6	R2-22,R4-134 R1-26 R1-29 R1-32
2	Object Oriented System Development • Introduction to Function/data methods • Object Oriented Analysis • Object Oriented Design • Object Oriented Testing	2	R3-436 R3-471
3	Introduction to UML • Overview of UML • Conceptual Model of UML • Architecture • S/W Development Life Cycle	3	R1-36 R1-39 R1-52 R1-55
4	• Basic and Advanced Structural Modeling Classes • Relationship • Common mechanism • Diagrams • Class Diagrams • Interfaces, Types, and Roles • Packages • Instances • Object diagrams	6	R1-69 R1-83 R1-97 R1-113 R1-127 R1-177 R1-191 R1-205 R1-217
5	Basic Behavioral Modeling • Interactions • Use cases • Use case diagram • Interaction diagram • Activity Diagram • State Chart diagram	4	R1-227 R1-241 R1-255 R1-265 R1-279 R1-353

6	Architectural Modeling & Re-Engineering • Components • Component diagram • Deployment diagram • Reverse Engineering • Forward Engineering	4	R1-365 R1-415,R4-653 R1-429 R4-878 R4-884
7	Object Oriented Analysis • Inception • Categories of Requirement • Use case model • Actor, Kinds of Actor • Use cases in Iterative Method • Elaboration • Construction • Transition	4	R4-48 R4-56 R4-64 R4-66 R4-95 R4-128 R4-33 R4-33
8	Object Oriented Design • Generic components of OO Design model • System Design process - Partitioning the analysis model - Concurrency and subsystem allocation - Task Mgmt component - Data Mgmt component - Resource Mgmt component - Inter sub-system communication • Object Design process	4	R5 – 579 R5 – 611 R5 - 618
9	Object Oriented Testing • Overview of Testing and object oriented testing • Types of Testing • Object oriented Testing strategies • Test case design for OO software • Inter class test case design	4	R5 – 632 R5 – 633 R5 - 636 R5 - 637 R5 - 645
10	Iterative, Evolutionary and Agile • Unified Process, Rational Unified Process • UP Phases • UP Disciplines • Agile UP • Agile Methods and Attitudes • Agile Modeling	5	R4-18 R4-33 R4-34 R4-31 R4-27 R4-30
11	Case Studies on UML	6	R6 & Ref Books

References :
R1 : The Unified Modeling Language User Guide by Gr.Booch,Rumbaugh,Jacobson
R2 : The Unified Software Development Process by Ivar Jacobson,Booch,James Rumbaugh
R3 : Software Engineering Principles and Practice by Waman Jawadekar
R4 : Applying UML and Patterns by Craig Larman
R5 :Software Engineering by Pressman Fifth Edition
R6 : Object Oriented Software Engineering by Ivar Jacobson

Other References :
UML in NutShell by O'Relly
Object Oriented Design by Peter Coad, Edward Yourdon

CS 406 Modeling And Simulation
Elective IV (Departmental)

Total Lectures : 52

Ch.No.	Name of the Chapter	Total no of lectures	Ref books and page nos
1	Random Number Generators • Properties of a good random number generator. • Linear Congruential Generators • Testing Random Number Generators Chi-Square Test Run Test	4	R1: 7.1 R1: 7.2 R1: 7.4.1
2	Review of Basic Probability and Statistics • Random Variable and their properties o Discrete and Continuous random variables o Probability distribution of a discrete and o continuous random variable. o Distribution Function. o Mean and Variance o Joint Probability distribution for a o discrete and continuous random var. o Marginal Probability distributions. o Covariance and Correlation	12	R1: 4.2
3	Selecting Input Probability Distributions • Introduction • Useful Probability Distributions ▪ Discrete Distributions: Binomial, Discrete Uniform, Geometric, Poisson ▪ Continuous Distributions Uniform, Exponential, Gamma, Normal, Parato • Techniques for assessing sample Independence • Hypothesizing families of distributions ▪ Summary Statistics ▪ Histograms ▪ Quantile Summaries • Estimation of parameters • Determining how representative the fitted distributions are ▪ Density/Histogram overplots ▪ Distribution function difference plot ▪ Probability plots(P-P and Q-Q) ▪ Chi Square test for goodness of fit	12	R1: 6.1 R1: 6.2.3 R1: 6.2.2 R1: 6.3 R1: 6.4 R1: 6.5 R1: 6.6

	▪ Kolmogorov Smirnov Test		
4	Generating Random Variates • Inverse Transform • Generating Discrete random variates Uniform, Binomial, Geometric, Poisson • Generating Continuous random variates Uniform, Exponential, Normal	4	R1: 8.2.1 R1: 8.4 R1: 8.3
5	Basic Simulation Modeling • Nature of Simulation and application areas of simulation • Systems, Models and Simulation • Discrete Event simulation Time-Advance Mechanisms Components and organization of a Discrete-Event Simulation model • Simulation of a Single Server Queuing System ▪ Manual simulation with an illustration ▪ Program Organization and Logic • Simulation of a Two Server Queue • Simulation of an Inventory system ▪ Manual Simulation with an illustration ▪ Program Organization and Logic • Continuous Simulation (Examples) • Monte Carlo Simulation (Examples) • Advantages, Disadvantages of Simulation	14	R1: 1.1 R1: 1.2 R1: 1.3 R2: 17.8 R3: 73-75 R3: 76-81 R2: 17.11-1 R1: 1.5.1-1.5.2 R3: 15-27 R2: 17.10 R1: 1.9
6	Output Data Analysis • Introduction • Statistical analysis • Obtaining Specified precision	4	R1: 9.1 R1: 9.4.1
7	Validation and Verification	2	R1: 5

Note: 80 marks for theory and 20 marks for practical assignments.

Reference Books:

R1: Simulation Modeling And Analysis: Averill M.Law , W. David Kelton Tata McGraw-Hill Edition
R2:Operations Research: S.D.Sharma
R3: System simulation with Digital Computer: Narsingh Deo Prentice-Hall of India

CS 406 Embedded Systems
Elective IV (Departmental)

Total Lectures: 50

Chapter No.	No. of lectures	Name of book
Chapter 1 • Introduction • Definition of Embedded system • Embedded system block diagram • Classification of Embedded systems • Embedded system-on-chip (SoC) and use of VLSI circuit design • Design process • Design metrics • Examples of Embedded systems	3	Embedded system Design --- Steve heath
Chapter-2 **8051 and Advanced Processor Architectures, Memory organization and Real world Interfacing** • 8051 Architecture – (Block diagram, explanation of block diagram) • A brief about 8051 Instruction Set (??) • Device addresses in Real world interfacing- address bus, data bus, control bus, memory mapping techniques- I/O mapped I/O, memory mapped I/O • Interrupts in 8051 processor (??) • Introduction to advanced architectures: • 80x86 architecture, ARM processor, DSP processor (Block diagram level), CISC,RISC • Instruction level parallelism (pipelining and superscalar architecture) (??) • Memory : ROM : Masked ROM, EPROM,EEPROM,OTP ROM, Flash memory, RAM : SRAM,DRAM, SDRAM,RDRAM, Address allocation in memory. • Peripheral Devices: Different I/O types, serial devices, parallel port devices, timers and counters, watchdog timer, RS232, USB, UART, parallel bus device protocol --- parallel communication using ISA,PCI, PCI-X and advanced buses.	10	Embedded system Design --- Steve heath, Embedded system— Raj kamal

Chapter 3 **Device drivers and Interrupt Service Mechanism** • ISR concept • Interrupt sources • Interrupt servicing mechanism • Multiple interrupts • Device driver programming (virtual device drivers, parallel port drivers in system, serial port drivers in a system, device drivers for internal programmable timing devices.	6	Embedded system Design --- Steve heath
Chapter 4 **Real Time Operating System** • Process, process states, context switch, scheduler, priority inversion, reentrant function, shared data, Inter process communication, (enabling and disabling of interrupt, event flags, semaphore, pipe, message, mailbox) • Commercial real time operating systems • Basic design using RTOS • RTOS task scheduling models, Interrupt latency and response of tasks • Hard real time scheduling considerations	10	Embedded system Design --- Steve heath, Embedded system design and RTOS --- Micheal barr Embedded system Design – David E Simon
Chapter 5 **Programming concepts and Embedded programming in 'C'** • Software programming in Assembly language and high level language 'C' • C extensions for embedded system • Case study(??) • Concept of porting of kernel • Creating library • Using standard library	10	Embedded system Design --- Steve heath
Chapter 6 **Testing, Debugging and simulation techniques** **Compilation process** • Cross compilation (concept only) • Linker/Loader, linker/loader options • High level language simulation • Low level language simulation • Onboard debugger • Emulation techniques : JTAG, OnCE	6	Embedded system Design --- Steve heath

Chapter 7 **Real time performance without using RTOS** • Choosing the software environment • Scheduling the data sampling • Deriving the real time performance from non real time system	5	Embedded system Design --- Steve heath

Reference Books:

Embedded system design --- Steve heath
Embedded system Design --- Frank Wahid
Embedded system Design – David E Simon
Embedded system Design --- Raj Kamal
Real time operating system --- Micheal Barr

CS 406: MFC
Elective IV (Departmental)

Total Lectures: 45

Topics	Reference	
	Book No.	Page No
Chapter – 1: **Introduction** (No. of Lectures 3)		
1. The Windows Programming Model • Message Processing • Windows Graphics Device Interface • Memory Management • Dynamic Link Libraries • Win32 Application Programming Interface	1	3
2. Visual VC++ Components • Code compilation • Resource compilation • Linker	1	6
3. "Hello World" program • Example	1	33
Chapter – 2: **Application Framework** (No. of Lectures 2)		
1. What is application Framework?	1	22
2. Uses of Application Framework • Framework use a standard structure • Framework are small and fast • Reduce coding drudgery	1	17
3. Application Framework Example	1	26
Chapter – 3: **Graphics Device Interface, Colors & Fonts** (No. of Lectures 12)		
1. Event handling • Message Map Function • Invalid Rectangle • Window's client area	2	27
2. Device Context Classes • CClientDC Class • CWindowDC class • CPaintDC Class • Constructing & Destroying CDC Objects	1	75
3. GDI Object • CBitmap,CBrush,CFont,CPalette • CPen,CRgn • Constructing & Destroying GDI bject	2	54

4. Mapping Mode • GDI Mapping Modes • Cordinate conversion	2	46
5. Windows Common Controls • Progress Bar • Track Bar • List Control • Tree Control • SpinControl • Slider	1	131
6. Windows Message Processing • Timer • On-idle Processing • Multithreaded Programming	2	805
Chapter – 4: **Windows Common Dialogs** (No. of Lectures 5)		
1. Dialog Controls • Edit Box • Radio Button • Button • List Box • Static Text • Combo Box • Horizantal Scroll Bar • Vertical Scroll Bar	2	315
2. Modal Dialog Box • Example	1	103
3. Modaless Dialog Box • Example	1	147
4. Windows Common Dialogs • CFileDialog • CFontDialog • CPrintDialog • CFileDialog • CColorDialog	1	156
Chapter – 5: **The Document View Architecture** (No. of Lectures 12)		
1.Menus,Keyboard Accelerator,Rich Edit Control • Command Processing • Command Message Handling classes • CEditView Classes • CRichEditView Class • CRichEditCtrl	1,2	287,177

2. Property Sheet • Buliding a Property Sheet, • Property Sheet Data Exchang	1	301
3. ToolBar & Status Bar • Button States • Toolbar & Command Messages • ToolTips • Status Bar Definition • The Message Line • Status Indicator	1	323
4. Splitting Windows • The Splitter Window • Dynamic & Static Splitter Windows	2	639
5. SDI Application • Serialization • SDI Application	2	302
6. MDI Application • MDI Application	2	610
Chapter –6: **Component Object Model** (No. of Lectures 2)		
1. Component Object Model • Introduction • COM Interface • COM with the MFC library	1	639
Chapter – 7: **ATL & ActiveX Controls** (No. of Lectures 5)		
1. ATL • Introduction to ATL	1	784
2. ActiveX Controls • What is ActiveX Control? • Creating & Developing ActiveX Control	1	
Chapter – 8: **Database Management with Microsoft ODBC** (No. of Lectures 4)		
1. Advantages of Database Management	1	898
2. The ODBC Standard • MFC ODBC Classes • MFC CRecordView Classes • Microsoft Data Access	1	899

Note: 80 marks for theory and 20 marks for practical assignments.
Reference Books:-
Programming Microsoft Visual C++
By David Kruglinski.
Programming Windows With MFC : By Jeff Prosise.

CS 406:System Administration II(Linux/Unix)
Elective IV (Departmental)

Objective :

- To meet the ever increasing demand for Linux skills
- To promote thinking in terms of functionality rather than software
- To acquire the basic skill of System Administration
- This course is aimed to provide detailed know how of the GNU/Linux system to the user at level where the person after the successful completion of the course will have a understanding of the OS, will be able to manage/install/upgrade packages. Basic system tweaking, modifying run levels, modify services status, security setup etc.

Total Lecture : 48

Sr.No.	Contents	No. of Lectures
1	**Introduction** • Know Your PC • Unix and Linux History • Different Linux Distribution	2
2	**System Administration Overview** • Daily tasks of system Administrator • Responsibilities of System Administrator	2
3	**Linux Installation** • Text VS Graphics • Partitioning & Disk mgt • Package mgt • GUI Configuration	3
4	**File manipulation Under Linux** • Copy rename,delete & move • File & directory listing • File handling & I/O redirection • File systems and their types • Names & contents of important Unix/Linux file directories • Compatibility of file Systems • Fsck & Disk check Commands • Log files	6
5	**Command Line Interface** • Text Manipulation Commands e.g. cut,grep,egrep,split,paste • Vi editor • su,ps,find,make,df/du • Introduction to Regular expression • awk,sed,passwd,wc,Antivirs,utilities,tar,gzip/gunzip,accessing pen drive,C.D.,gdb	6

6	**Users and Groups** • Concept of users & groups • Owner creator • Primary and Secondary group • Types of file and directory permission	3
7	**Startup/shut down** • Booting • Run Levels • /etc/init tab • shut down • crashes	2
8	**Basic system Administration** • Managing Users and groups(from console & GUI modes) Using command like adduser, userdel, groupadd, groupdel etc. • Basic Network Setup Setting hostname, IP address of the machine. Setting a dialup connection. • Installing and removing packages. Using the RPM, source package installation, URPMI. • Managing Partitions Understanding the/etc / fstab • Boot loader management Understanding the lilo and grub boot loader and its configuration files. • Configuring services, chkconfig, ntsys, start, Resart & stop Service	10
9	**Networking** • Internetworking with windows(samba) • Ping Telnet, ftp, ssh program • NIS, NFS, Tomcat web server	10
10	**Print Services** • Prints Installation & Addition • Print sports • Print command	4

University of Pune

Proposed Draft of

M.C.A. (Science faculty) COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2009-10

MCA Semester-IV

CS-406 Database Administration I (MySQL)

Total numbers of lectures: 52

Chapter No & Name	Name of the topics in chapter	Total No of lectures	Ref Books
1 Client/Server Concepts	General MySQL Architecture, Invoking Client Programs, Server SQL Modes	2	B2,B3
2 The mysql Client Program	Using mysql Interactively, Statement Terminators, The mysql Prompts, Editing Keys in mysql, Using Script Files with MySQL, mysql Output Formats, Client Commands and SQL Statements, Using Server-Side Help, Using the --safe-updates Option	2	B1,B2
3 Data Types and Functions in MySQL	Numeric Data Types, The BIT Data Type, String Data Types, Temporal Data Types, Column Attributes, Using the AUTO_INCREMENT Column Attribute, Handling Missing or Invalid Data Values, Aggregate Functions, Numeric Functions, String Functions, Date Functions, DateTime Functions	2	B1,B3
4 Identifiers	Identifier Syntax, Case Sensitivity, Using Qualified Names, Reserved Words as Identifiers	1	B1,IL2
5 Basic SQL	Creating Databases ,Altering Databases, Dropping Databases, Creating Tables, Altering Tables, Emptying Tables, Dropping Tables, Indexes, Dropping Indexes	1	B1,B2,B3
6 Querying for Data	Using SELECT to Retrieve Data, Specifying Which Columns to Retrieve, Specifying Which Rows to Retrieve, Aggregating Results, Grouping Results	1	B1

Syllabus of T. Y. M. C. A. (Science)

2010-11

University of Pune

Proposed Draft of

M.C.A. (Science faculty) COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2009-10

MCA Semester-IV

CS-406 Database Administration I (MySQL)

Total numbers of lectures: 52

Chapter No & Name	Name of the topics in chapter	Total No of lectures	Ref Books
1 Client/Server Concepts	General MySQL Architecture, Invoking Client Programs, Server SQL Modes	2	B2,B3
2 The mysql Client Program	Using mysql Interactively, Statement Terminators, The mysql Prompts, Editing Keys in mysql, Using Script Files with MySQL, mysql Output Formats, Client Commands and SQL Statements, Using Server-Side Help, Using the --safe-updates Option	2	B1,B2
3 Data Types and Functions in MySQL	Numeric Data Types, The BIT Data Type, String Data Types, Temporal Data Types, Column Attributes, Using the AUTO_INCREMENT Column Attribute, Handling Missing or Invalid Data Values, Aggregate Functions, Numeric Functions, String Functions, Date Functions, DateTime Functions	2	B1,B3
4 Identifiers	Identifier Syntax, Case Sensitivity, Using Qualified Names, Reserved Words as Identifiers	1	B1,IL2
5 Basic SQL	Creating Databases ,Altering Databases, Dropping Databases, Creating Tables, Altering Tables, Emptying Tables, Dropping Tables, Indexes, Dropping Indexes	1	B1,B2,B3
6 Querying for Data	Using SELECT to Retrieve Data, Specifying Which Columns to Retrieve, Specifying Which Rows to Retrieve, Aggregating Results, Grouping Results	1	B1

	Using UNION		
7 MySQL Expressions	Components of SQL Expressions , Numeric Expressions, String Expressions, Temporal Expressions, NULL Values, Functions in SQL Expressions, Comments in SQL Statements	1	B1,B3
8 Updating Data	Update Operations, The INSERT Statement, The REPLACE Statement, The UPDATE Statement, The DELETE and TRUNCATE TABLE Statements, Privileges Required for Update Statements	2	B1
9 Joins	Overview, Writing Inner Joins, Writing Outer Joins, Resolving Name Clashes Using Qualifiers and Aliases, Multiple-Table UPDATE and DELETE Statements	2	B1
10 Subqueries	Types of Subqueries, Subqueries as Scalar Expressions, Correlated Subqueries , Comparing Subquery Results to Outer Query Columns, Comparison Using Row Subqueries , Using Subqueries in the FROM Clause, Converting Subqueries to Joins,Using Subqueries in Updates	2	B1
11 Views	Reasons to Use Views , Creating Views, Altering Views, Dropping Views, Checking Views, Displaying Information About Views, Privileges for Views	2	B1
12 MySQL Architecture	Client/Server Overview, Communication Protocols, The SQL Parser and Storage Engine, Tiers, How MySQL Uses Disk Space, How MySQL Uses Memory	3	B2
13 Starting, Stopping, and Configuring MySQL	Types of MySQL Distributions, Starting and Stopping MySQL Server on Windows, Starting and Stopping, MySQL Server on Unix, Runtime MySQL Configuration, Log and Status Files, Loading Time Zone Tables, Security-Related Configuration, Setting the Default SQL Mode, Upgrading MySQL	5	B1, B2
14 Client Programs for DBA Work	Overview of Administrative Clients, mysql, Mysqladmin, mysqlimport, mysqldump, Client Program Limitations	4	B1
15 Character Set Support	Performance Issues, Choosing Data Types for Character Columns	3	B1
16	Locking Concepts , Explicit Table	2	B1

Locking	Locking, Advisory Locking		
17 Storage Engines	MySQL Storage Engines, The MyISAM Engine, The MERGE Engine, The InnoDB Engine,The MEMORY Engine, The FEDERATED Engine, The Cluster Storage Engine, Other Storage Engines	5	B1,B2
18 Data (Table) Maintenance	Types of Table Maintenance Operations, SQL Statements for Table Maintenance, Client and Utility Programs for Table Maintenance, Repairing InnoDB Tables, Enabling MyISAM Auto-Repair	4	B1,B2
19 The INFORMATION_SCHEMA Database	INFORMATION_SCHEMA Access Syntax, INFORMATION_SCHEMA Versus SHOW, Limitations of INFORMATION_SCHEMA	4	IL1
20 Data Backup and Recovery Methods	Introduction, Binary Versus Textual Backups, Making Binary Backups, Making Text Backups, Backing Up Log and Status Files, Replication as an Aid to Backup, MySQL Cluster as Disaster Prevention, Data Recovery	4	B2

References:

1. MySQL 5 for Professionals By Ivan Bayross, Sharanam Shah [SPD Publications]
2. High Performance MySQL By Jeremy D. Zawodny, Derek J. Balling [O'Reilly Media Publications]
3. MySQL in a Nutshell By Russell Dyer [O'Reilly Media Publications]

Important Links:

1. http://www.thegeekstuff.com/2008/11/overview-of-mysql-information_schema-database-with-practical-examples/
2. http://www.learn-mysql-tutorial.com/Identifiers.cfm

University of Pune

Proposed Draft of

M.C.A. (Science faculty) COMPUTER SYLLABUS

TO BE IMPLEMENTED FROM ACADEMIC YEAR 2010-11

SEMESTER V

Code	Subject Name
CS-501	Cryptography and Network Security
CS-502	Internet Programming
CS-503	Design patterns
CS-504	Data Warehousing and Mining(Departmenta)
CS-505	Software Testing and Quality Assurance
CS-506	Elective V-(Departmental)
	1. Current Trends and Technology
	2. Expert System
	3. Foreign Languages
	4. Database Administration II
CS-507	General Laboratory (Departmental) (Assignments on Internet Programming and a Project in Java/MFC (50 marks Assignments and 50 marks Project)

MCA Semester-V

CS-501 Cryptography and Network Security

Total numbers of lectures: 48

Chapter No	Name of the topics in chapter	Total No of lectures	Ref Book & page no
1. Introduction to concept of security	Need, Principles, Policy, Types of attacks, Basic Network security terminology	3	T1:1-25 T2:1-10,306-328
2. Basic Cryptography	Definition, Goals of Cryptography, Encryption and Decryption, Classical Cryptographic Techniques, Substitution ciphers, Transposition ciphers, Steganography : uses and security ,Cryptanalysis	4	T1:29-39 T2:11-31
3. Types of Cryptography	Symmetric Key Cryptography : Stream Ciphers, Block Ciphers, Algorithm Types and modes (Electronic code book, Cipher block chaining, Cipher feedback, Output Feedback) Computer based Symmetric Key Cryptographic Algorithms (Data Encryption Standard and variations, International Data Encryption Algorithm , RC5, Blowfish)	10	T1:63-106 T2:32-73,87-105 T4: 265-364
4. Mathematical Foundation (Number Theory)	Prime number, Fermat's Theorem, Euler's Theorem, Modular arithmetic, Discrete Logarithms, Quadratic Residues, Chinese remainder theorem, Primality testing	2	T1:396-400, T2: 106-117 T3;488-491 T4: 233-261
5	Asymmetric Key Cryptography (Public Key Cryptography) Diffie Hellman Key exchange algorithm, RSA algorithm, One way hash function, Digital Signature, MD5, Secure hash algorithm, Digital Certificates	10	T1:112-160,162-165 T2:118-137,204-215 T4:429-455,466-472
6	Network Security introduction, revision of TCP/IP,IP datagram format, Virtual private networks	2	T1:333-369
7	IP Security , IPsec protocol, Internet Key exchange protocol, Authentication header, Encapsulating Security Payload	5	T1: 333-369 T2:239-266
8. Internet Security Protocols (Web Security) Security	Socket layer, Secure hypertext transfer protocol, Secure electronic transaction, Pretty Good Privacy, S/MIME,	4	T1:212-270 T2:267-280,216 -238

9. Authentication	User Authentication , Password based authentication, Certificate based authentication, Biometric authentication, Kerberos, Ticket granting approach, Authentication Model, Kerberos and Public key cryptography, Applications of Kerberos, X.509 authentication service	4	T1:271-309 T2:162-203
10. Firewall	Introduction, Packet Filters, Application level gateways, Circuit level gateways, Firewall architecture, Benefits and limitations of Firewall, access control mechanism.	4	T1:338-348 T2:329-343

References:

T1: Cryptography and Network Security By Atul Kahate (Tata Mcgraw-hill Publishing Company Limited)

T2: Cryptography and Information Security By V.K. Pachghare (PHI Learning Private Limited)

T3: Introduction to Computer Security By Matt Bishop and Sathyanarayana (PEARSON EDUCATION)

T4: Applied Cryptography Protocols, Algorithms, and Source Code in C By Bruice Schneier (Wiley India)

Important Links:

1. http://crsc.nist.gov/publications/nistpubs/index.html
2. Virus Bulletin: http://virusbtn.com
3. http://www.cryptool.org

Note:

No question to be asked on

1. Mathematical Foundation (Number Theory)
2. Network Security introduction & revision of TCP/IP,IP

MCA Semester-V

CS 502 : Internet Programming with PHP

Total numbers of lectures: 45

Chap. No.	Chapter Name	Total No. of Lectures
1	Introduction to Internet Programming. ▪ Client <-> Server model ▪ Browsers - Graphical and Hypertext Access to the Internet ▪ HTTP - HyperText Transfer Protocol (how it actually works).	02
2	Overview and Language Essentials	02
3	Output, Associative Arrays, Debugging	04
4	HTML forms, the $_POST array, and writing to files	05
5	Reading files, Reading from other Servers Security: Filtering Input and Escaping Output	06
6	Strings and Parsing	06
7	Carrying Data from Page to Page: Cookies and Sessions Functions and Objects	06
8	XML and JSON responses	09
9	E-mail from your script	05

References:

B1: PHP Programming by orielly series.
B2:Beginning XML by David Hunter and David Gibbons.
B3:AJAX and PHP: Building Responsive Web Applications
by Cristian Darie, Bogdan Brinzarea, Filip Chereches-Tosa, Mihai Bucica;

MCA Semester-V

CS 503: Design Patterns

Total numbers of lectures: 48

Chapter. No.	Chapter Name	Total No of Lectures	Books
1	Introduction to Patterns What is a Pattern, What Makes a Pattern? Pattern Categories	02	B1
2	Architectural Patterns Layers, Pipes and Filters, Blackboard, Broker, Model View Controller	10	B1
3	Introduction to Design Pattern What is a Design Pattern? ,Describing Design Pattern, The Catalog of Design Patterns, Organizing the Catalog	03	B7
4	Creational Design Pattern Abstract Factory, Prototype, Singleton	09	B7
5	Structural Design Pattern Adapter, Decorator, Proxy	09	B7
6	Behavioral Design Pattern Command, Observer, Strategy	09	B7
7	Introduction to Idioms What can Idioms Provide? Idioms and Style, Counted Pointer Idioms	06	B1

References:

B1: Pattern Oriented Software Architecture (ISBN: 9971-51-421-4) by Frank Bushmann
Regine Meunier, Hans Rohert,Peter Sommerlad, Micheal Steal (John Wily & Sons Ltd.(Volume I)

B2: Design Patterns (ISBN: 81-7808-135-0) by Erich Gamma, Richard Helm, Ralph Johnson,John Vlissides (Pearson Education Inc.)

MCA Semester-V

CS-504 Data Warehousing and Data Mining

(Departmental)

Total Number of Lectures: 48

Chapter No	Name of topics	Total no of lectures	Ref. Book
1	Data Warehouse, Need for data warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation	3	1,2,4,8
2	Data WareHouse and Technology, Data Marting, When is Data Mart Appropriate, Cost of Data Marting, Testing data Warehouse	3	1,2,4,8
3	Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Mining Vs KDD, Data Warehousing to Data Mining	6	1,2
4	DATA PREPROCESSING, LANGUAGE, ARCHITECTURES,KDD : Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretisation and Concept Hierarchy Generation, Online Data Storage, Data Mining Primitives, Languages	3	1,3
5	CONCEPTS DESCRIPTION: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases	8	1
6	ASSOCIATION RULES : Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases	8	1
7	CLASSIFICATION & CLUSTERING Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.	8	1,4,7

8	Web Mining , Spatial Mining, Temporal Mining	7	1,3
9	Case Study, Usage of Data Mining Tool	4	

References:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Data Mining: Introductory and Advanced Topics- Margaret H.Dunham, S.Sridhar
4. Data Warehousing in the real world,- Sam Anahory, Dennis Murry, Pearson Education.
5. Building the Data Warehouse- William Inmon
6. Data Warehousing Fundamentals- Paulraj Ponniah, Wiley-Interscience Publication.
7. Data Mining – Pieter Adriaans, Dolf Zantinge
8. The Data WareHouse Toolkit – Ralph Kimball

MCA Semester-V

CS – 505 Software Testing and Quality Assurance

Total Number of Lectures: 48

Chapter No. & Name	Name of topic in Chapter	Total No. of lectures	Ref. Book & Page Nos.
1. Software Testing	Introduction, Nature of errors An example for Testing	4	Book2 Pgs. 267 - 269
2. Software Testing Methods	Testing Fundamentals, Test Case Design, White Box Testing Black Box Testing	6	Book1 Pgs. 448 –455 470 - 471
3. Testing For Specialized Environments	Testing GUI's, Testing of Client/Server Architectures, Testing Documentation and Help Facilities, Testing for Real-Time Systems	6	Book1 Pgs.477- 481
4. Software Testing Strategies	Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing ,System Testing	7	Book1 Pgs. 487-493 494-509
5. Software metrics	Introduction, Basic Metrics, Complexity Metrics	5	Book 2 Pgs. 357- 361
6. Software Quality Assurance	Concepts, Quality Movement, Background issues and SQA activities Software Reviews, Formal Technical Reviews, Formal approaches to SQA Statistical Quality Assurance, Software Reliability, SQA Plan, The ISO 9001 Quality Standard, Six sigma	8	Book 1 Pgs. 179-203
7. Quality Improvement	Pareto Diagrams, Cause-Effect Diagrams, Scatter Diagrams, Run Charts	4	Book 3,4,5

Techniques			
8. Quality Costs	Quality Cost Measurement, Utilizing Quality Costs for Decision-Making	3	Book 3,4,5
9. Testing Tools (Introduction and execution only)	Junit, Apache Jmeter, Winrunner Loadrunner, Rational Robot	5	www.opensourcetesting.org

References:

Book 1) Software Engineering – A Practitioners Approach
Roger S. Pressman
Tata McGraw Hill
Book 2) Software Engineering for Students- A Programming Approach
Douglas Bell
Pearson Education
Book 3) Quality, 5th ed., Prentice-Hall, 2010.
Donna C. S. Summers
Book 4) Total Quality Management, Prentice Hall, 2003.
Dale H. Besterfield
Book 5) Software engineering: An Engineering approach, John Wiley.
J.F.Peters, W.Pedrycz

MCA Semester-V

CS – 506 Current Trends and Technology

(ASP.NET using C#)

Total Number of Lectures: 48

Chapter No & Name	Name of the Topics in chapter	Total No of lectures	Ref Book & Page no. eg:T1 –pg 345
1. Overview of .NET	Building Blocks of .NET Framework, .NET Compatible Languages, CLS (Common Language Specification), CTS (Common Type System), CLR (Common Language Runtime), Working of CLR, Assembly and Components of Assembly	3	3
2. The C# Programming Language	Structure of C# Program, Passing Command line arguments, System.Console class, Sytem.Object Class, Value Types and Reference Types, Implicit and Explicit Conversion, Boxing and Unboxing, .NET Enumerations, Method Parameter Modifiers (ref, out and params), Array types, System Data Types, System String DataType	4	1,2
3. Inheritance and Polymorphism	Pillars of Object oriented Programming, Class and Class Members, Access Modifiers, Constructor,	3	1,2

	Destructor, Property, Indexer, Methods, Interface, Structure, Inheritance, Polymorphism		
4. Exception Handling	Exception Handling, Exception Class, User Defined Exception	1	1,2
5. Understanding Garbage Collection	Memory Management Basics, Garbage Collection, Garbage Collection Phases, Generational Garbage Collection, Resource management, Implicit, Explicit	3	1,2
6. Unsafe Code	Pointers, Writing Unsafe Code	1	1,2
7. Delegates and Events	Delegate, Unicast Delegate, Multicast Delegate, Delegate Chaining, Asynchronous Delegate, Anonymous Methods, Events	2	1,2
8. Collection Classes	Collections, System.Array Class, Collection Interfaces, Non-Generic Classes, ArrayList, Stack, Queue, HashTable, Generic Classes, List<T>, Stack<T>, Queue<T>, Dictionary<K,V>, LinkedList<T>	3	1,2
9. Reflection, Late Binding,	Reflection, Sytem.Type Class , System.Reflection Class, Assembly Class, MemberInfo	2	1,2

Attributes	Class, Late Binding, Attributes, Standard Attribute Custom Attribute		
10. .NET Assemblies	Assembly, Components of Assembly, Private Assemblies Shared Assemblies	2	1,2
11. Threading	Thread Synchronization	1	1,2
12. File I/O and Synchronization	System.IO Namespace, Stream Class, Serialization, Binary Serialization, XML Serialization, SOAP Serialization	3	1,2
13. System.Windows.Forms	Windows Application, Windows Form Namespace, Windows Application, Form, Common members of Form class, Controls, Properties and Events, Dialog Boxes, Graphics Class	3	2,3
14. ADO.NET	Data Providers, ADO.NET Components, ADO.NET Objects, ADO.NET Interfaces, Connected and Disconnected architecture	3	2,3
15. ASP.NET Architecture	ASP.NET Architecture, IIS (Internet Information Services), HTTP Pipeline, Postback and ViewState, Page Life Cycle, Intrinsic objects of Page Class	3	3

16. Controls	HTML Control, Web Server Control, Validation Control, Rich Web Server Control	2	3
17. State Management and Caching	Client Side, View state, Cookies, Querystring, Server Side, Application variable, Session Variable, Session State Management using SQL Server, Caching, Page Caching, Fragment Caching, Data Caching	3	3
18.	User Controls	1	3
19.	Master Pages and Themes	2	3
20.	LINQ	3	3

References:

1. Inside C# by Tom Archer and Andrew Whitechapel
2. Profesional C# 2005/2008 by Wrox Publication
3. Profesional ASP.NET 2005/2008 by Wrox Publication

CS-506 Expert Systems (Elective)

Total numbers of lectures: 47

Chapter No & Name	Name of the topics	Total No of lectures	Book
Chapter:15 Expert systems architecture	Introduction, Rule-based system architectures, Non production system architectures, Dealing with uncertainty, Knowledge acquisition and validation, Knowledge system building tools.	7	B1
Chapter:16 General Concepts in Knowledge Acquisition	Introduction, Types of learning knowledge acquisition is difficult, General Learning model, Performance measures	5	B1
Chapter:18 Learning by induction	Introduction, basic concepts & definitions, Generalization and Specialization, Inductive bias, Example of an inductive learner.	5	B1
Chapter: 17 Early work in machine learning	Introduction, Perceptrons, checker playing example, learning Automata, genetic algorithms, intelligent editors	8	B1
Chapter: 20 Analogical & Explanation based learning	Introduction, analogical reasoning & learning, examples of analogical, reasoning systems, explanation based learning	7	B1
Neural Networks	Hop field n/w, Learning in neural n/w, Back propagation, Boltzmann machines, Recurrent n/w, Distributed representation, comparison between connectionist & symbolic approaches	14	B3 & B4

References:

1. Introduction to Artificial intelligence and Expert system –Dan W. Patterson
2. Artificial intelligence – Knight
3. Recurrent Neural networks for prediction – Mandic, Chambers
4. An introduction to neural network – Kevin Gurney

CS-506 Foreign Language (FRENCH)

Total numbers of lectures: 48

Unit	Name of the topics in chapter	Total No of lectures	Ref Book & page no
	Introduction to France, Numbers, Alphabet	1	Pages 1 – 10
0	Unit 0	9	Pages 9-22
1	Lesson 1	6	Pages 24-34
1	Lesson 2	5	Pages 36-44
1	Lesson 3	7	Pages 46-57
1	Lesson 4	10	Pages 59-71
2	Lesson 1	10	Pages 73-88

References:

1. Jumelage

CS-506 Foreign Language (GERMAN)

Total numbers of lectures: 48

Unit	Name of the topics in chapter	Total No of lectures
	Introduction to germany, Numbers, Alphabet	1
0	Folk literature	9
1	Lesson 1	6
1	Modern Short Prose	5
1	Poetry	7
1	Longer Narrative Prose:	10
2	Translation of a seen / known literary passage	10

References:

Am kürzeren Ende der Sonnenallee by Thomas Brussig (gekürzt und vereinfacht by Ulla Malmmose) Volk und Welt Publishers Berlin 1999

CS – 506 Database Administration II

(Oracle 10g)

Total Number of Lectures: 48

Chapter No & Name	Name of the Topics in chapter	Total Number of lectures	Ref Book & Page nos. eg:T1 –pg 345
1. Oracle10g Instance creation and management	What is an Oracle Instance?, Installing Oracle, Oracle Optimal Flexible Architecture (OFA), Locating initialization, listener.ora & sqlnet.ora files, Finding the alert log, Common environment variables,Structures in an Oracle Instance, Oracle Memory Structures, SGA and PGA, Oracle Processes and their purposes, Startup nomount, mount and open database commands	4	
2. Oracle10g Database Architecture	Oracle10g management framework Using the Database Creation Assistant (DBA), Creating and dropping a database, Tablespaces, Tables and Indexes, Clusters, Partitioning of Tables and Indexes, Gathering and applying patches	6	
3. Concurrency Management	Transactions, Serialization, locks and latches, Lock Modes, Detecting and resolving lock conflicts, Managing Deadlocks	3	
4. Interfacing with Oracle	Oracle transaction management Using SQL *Plus and iSQL *Plus Using embedded Oracle with	3	

	Pro*C & JAVA, PL/SQL and Triggers, PiningPL/SQL packages and compiling PL/SQL, System-level triggers – startup trigger, logon trigger, PL/SQL error trigger		
5. Oracle*Net	Basic Network structure, Oracle*Net Files, Multi-threaded server, Create additional listeners, Create Oracle Net service aliases, Configure connect time failover, Use ping and tnsping Oracle*Net names resolution	4	
6. Tablespace Managemen Overview	Dictionary Managed Tablespaces Locally Managed Tablespaces, Automatic Segment Space Management, Moving tablespaces online and offline	6	
7. UNDO Tablespace Management	Use of undo segments,Creating an undo tablespace, User managed undo tablespaces, Automatic undo management, Monitor & Configure undo retention, Use the Undo Advisor Size the undo tablespace	6	
8. Oracle Performance Tuning	Locate invalid and unusable objects, Gather SQL optimizer statistics with dbms_stats, Basic Oracle performance metrics, Use OEM and dbms_alert to set warning and critical alert thresholds The SQL Tuning Advisor, The SQL Access Advisor Interpreting server generated alerts, Oracle advisory utilities vdb_cache_advice, vshared_pool_advice, v$pga_aggregate_target_advice Using OEM performance screens, Fixing performance issues	6	
9. User	Creating Users, Altering users, User Profiles, User resource groups, Granting privileges &	2	

Management	roles, Auditing user activity with dbms_audit		
10. Oracle Security	Password use in Oracle, Password encryption and password aging, External authentication, Using Single sign-on (SSO), Object security, Virtual Private Databases (VPD) in Oracle, Oracle "grant execute" security, Use of Roles in Oracle, Register for security updates	2	
11. Backup & Recovery	Oracle backup & recovery planning, Parallel instance recovery, Basics of checkpoints, redo log files, and archived log files, Using ARCHIVELOG mode, Creating consistent Oracle backups, Online hot backups, Incremental Oracle backups, Automating database backups with dbms_scheduler Monitor the flash recovery area Recovering from loss of a Control file, Recovering from loss of a Redo log file,Recovering from loss of a system-critical data file, Recovering from loss of a non system-critical data file	6	

References:

1. Oracle Essentials: Oracle database 10g By Rick Greenwald; Robert Stackowiak; Jonathan Stern
2. Oracle Databse 10g: The complete Reference By Kevin Loney
3. OCP: Oracle 10g new features for Administrator By Bob Byla and biju Thomas
4. OCA - Oracle 10g administrator's guide By Chip Dawes
5. Oracle Databse 10g: A beginner's guide By Ian Abramson, Michael S. Abbey, Michael Corey

Syllabus for M.C.A.
(Under Science Faculty)
in affiliated colleges to University of Pune
(To be implemented from Academic year 2014-2015)
Credit Based System
Semester 3 and Semester 4

CA - 301 Design and Analysis of Algorithms

Prerequisites:

1. Data structures.
2. Basic knowledge of Graphs and Algorithms.

Objectives:

1. To provide foundation in algorithm design and analysis
2. Ability to understand and design algorithms in context of space and time complexity.

Syllabus **[Total Lectures=48]**

CHAPTER-1:
Introduction **[5]**

- Definition of Algorithm & its characteristics
- Recursive and Non-recursive Algorithms
- Time & Space Complexity
- Iterative and Recursive Algorithm
- Definitions ofAsymptotic Notations(big-oh, big-omega, big-theta, small theta, small omega)
- Insertion Sort (examples and time complexity)
- Heaps & Heap Sort (examples and time complexity)
- Non-comparison-based Sort: Counting Sort(examples and time complexity)

CHAPTER-2:
Divide and Conquer **[5]**

- Control Abstraction
- Binary Search (recursive)
- Quick Sort (Examples and time complexity)
- Merge sort (Examples and time complexity)
- Comparison between Traditional Method of Matrix Multiplication vs. Strassen's Matrix Multiplication

CHAPTER-3:
Greedy Method **[6]**

- Control abstraction
- Fractional Knapsack problem
- Optimal Storage on Tapes
- Fast Job Sequencing with Deadlines
- Optimal Merge Patterns, Huffman codes
- Concept of Minimum Cost Spanning Tree
- Prim's and Kruskal's Algorithm
  (using both the methods Priority Queue and Set Data Structure)

CHAPTER-4:
Dynamic Programming [8]

- The General Method
- Principle of Optimality
- Matrix Chain Multiplication
- 0/1 Knapsack Problem
  i)Merge & Purge
  ii)Functional Method
- Concept of Shortest Path
- Single Source shortest path
  i)Dijkstra's Algorithm
  ii)Bellman Ford Algorithm
- All pairs Shortest Path
  i) Floyd- Warshall Algorithm
- Travelling Salesperson Problem

CHAPTER-5:
Backtracking [4]

- General method
- Fixed Tuple vs. Variable Tuple Formulation
- N-Queens Problem (Numerical examples till N=4)
- Sum of Subsets
- Graph Coloring
- Hamiltonian Cycle.

CHAPTER-6:
Branch & Bound [4]

- Introduction
- Definitions of LCBB Search
- Bounding Function, Ranking Function
- FIFO BB Search
- Traveling Salesman problem Using Variable tuple
- Formulation using LCBB
- 0/1 knapsack problem using LCBB

CHAPTER-7:

Transform & Conquer: [4]

- The General Method
- Evaluation and Interpolation
- The Fast Fourier Transform
- Horner's Rule
- Binary Exponentiation – Problem Reduction

CHAPTER-8:

Decrease and conquer: [8]

- Definition of Graph Representation of Graph
- By Constant - BFS and DFS, and Insertion
- By Variable Size decrease - Euclid's Algorithm
- By Factor - Binary Search
- Topological Sort/Order
- Strongly Connected Components
- Biconnected Component
- Articulation Point and Bridge edge

CHAPTER-9:

Problem Classification: [4]

- Basic Concepts: Deterministic Algorithm and Non deterministic
- Definitions of P, NP, NP-Hard, NP-Complete problems
- Sorting, Searching and Satisfiability, 0/1 problems discussion
- Cook's Theorem (Only Statement and Significance)
- Max. Clique Decision problem

Reference Books:

1. Book 1- Fundamentals of Computer Algorithms
   Authors - Ellis Horowitz, Sartaz Sahani, Sanguthevar Rajsekaran
   Publication: - Galgotia Publications
2. Book 2 – Introduction to Algorithms (second edition)
   Authors: - Thomas Cormen, Charles E Leiserson, Ronald L.Rivest , Clifford Stein
   Publication: - PHI Publication

Notes: -

- Both the topics from Dynamic Programming Longest Common Subsequence and String Editing are kept for Self Study. And, Internal Evaluation can be done on these topics.
- For Internal Evaluation, any algorithm which is apart from the syllabus can be given for analysis.

CA-301: Design and Analysis of Algorithms

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage in terms of Marks
1 : Introduction	5	6
2 : Divide and Conquer	5	6
3 : Greedy Method	6	6
4 : Dynamic Programming	8	18
5 : Backtracking	4	8
6: Branch & Bound	4	8
7 : Transform & Conquer	4	8
8 : Decrease and conquer	8	16
9 : Problem Classification	4	4

Examiner should note that,

1. Specify name of the method in case of Prim's and Kruskal's Algorithms.

2. Specify name of the method in case of 0/1 Knapsack Problem for Dynamic Programming.

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
  - There should not be more than one sub questions on the same unit
  - There should not be more than one question containing sub questions on the same pair of units.

Paper Pattern for DAA Paper for Credit Base System

Question No.	Marks
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-302: Operating System Concepts

Prerequisites:

3. Basic knowledge of computer architecture.
4. Introductory knowledge of different Operating Systems.

Objectives:

1. Understanding of OS architecture, process management and memory management
2. Through knowledge of process synchronization and CPU scheduling

Syllabus **[Total Lectures=48]**

CHAPTER -1

Introduction to Operating System: [1]

Definition of operating system, Services provided by OS, System Calls: definition, implementation

CHAPTER -2

Process Management [3]

Introduction and definition of process, Process state transition, Process Control Block, Process scheduling, Scheduling queues, Types of schedulers, Long Term Schedulers, Middle Term Schedulers, Short Term Schedulers, IO Scheduler, Context Switch.

CHAPTER -3

CPU Scheduling **[8]**

Introduction, Scheduling Concepts, CPU- I/O Burst Cycle, CPU Scheduler, Preemptive and Non-preemptive scheduling, Dispatcher, Scheduling criteria (terminologies used in scheduling), CPU Utilization, Throughput, Turnaround time Waiting time, Response time, Scheduling Algorithms,FCFS,SJF (Preemptive & non-preemptive),Priority Scheduling (Preemptive & nonpreemptive),Round Robin Scheduling, Multilevel Queues, Multilevel Feedback queues, Examples on scheduling algorithms

CHAPTER -4

Threads [2]

Multithreading, Threading Issues, P Threads, Windows 2000, Linux, Java Threads: Introduction only, no coding)

CHAPTER -5

Process Synchronization [6]

Introduction, Critical section problem, Semaphores, Concept, Implementation, Deadlock & Starvation, Binary Semaphores, Problems of synchronization, Bounded buffer problem, Readers & writers problem, Dining Philosophers problem, Critical Sections, Monitors

CHAPTER -6

Deadlocks [8]

Introduction, Deadlock Characterization, Necessary Condition, Resource allocation graph, Examples, Handling Deadlock, Deadlock Prevention, Mutual Exclusion, Hold & wait, No preemption, Circular wait, Deadlock Avoidance, Safe State, Resource allocation graph algorithm, Bankers algorithm, Examples, Deadlock Detection, Single instance of each resource type, Several instances of a resource type, Detection algorithm usage, Recovery from deadlock, Process Termination, Resource Preemption

CHAPTER -7

Memory Management **[8]**

Introduction to memory management, Problems with memory management, Logical vs. physical addresses, Dynamic vs. static linking, Swapping, Paging, Segmentation, Segmentation with paging, Virtual memory, Demand paging Page replacement algorithms, FIFO, MRU, LRU, LRU approximation using reference bit, MFU, LFU, Second Chance algorithm, Optimal replacement, Examples on Page replacement algorithm.

CHAPTER -8

File System **[6]**

Introduction & File concepts (file attributes, operations on files), Access methods, Sequential access, Direct access, Indexed access, File structure, File system mounting and sharing, Allocation methods, Contiguous allocation, Linked Allocation, Indexed Allocation, Free space management, Bit map or bit vector, Linked list, Grouping, Counting, File protection

CHAPTER -9

Device Management & I/O System [6]

Introduction and I/O Hardware, Interrupt (Maskable and Non-maskable), Kernel I/O Subsystem, I/O Scheduling, Buffering, Caching, Spooling and device Reservation, Error Handling, Kernel Data Structures, Disk Scheduling, First Come First Served, FCFS, Shortest seek time first (SSTF), Scan, C-Scan, LOOK, C-LOOK, Examples on Disk scheduling

Reference Book:

Operating System Concepts – Silberschatz, Galvin, Gagne

CA- 302 : Operating System

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage in terms of Marks
1 : Introduction to Operating System	1	2
2 : Process Management	3	7
3 : CPU Scheduling	8	8
4 : Threads	2	4
5 : Process Synchronization	6	15
6: Deadlocks	8	8
7 : Memory Management	8	12
8 : File System	6	12
9 : Device Management & I/O System	6	12

CA-303: Software Engineering

Prerequisites:

Knowledge of system development basics.

Objectives:

Understanding of software development lifecycle.

Syllabus **[Total Lectures=48]**

CHAPTER-1

Introduction To Software Engineering **[4]**

Definition, Characteristics of A Software, Mc Call's Quality Factors.

CHAPTER-2

Software Development process **[10]**

SDLC, Waterfall Model, Spiral Model, prototyping approach, 4GL approach.

Requirement Analysis. i) Definition of System Analysis. ii) Role of system analyst

iii) Requirement anticipation, investigation and specification iv) Feasibility study,

v) Fact finding techniques-interview, questionnaire, record review, observation.

CHAPTER-3

Analysis and design tools **[7]**

E-R analysis, Decision tree and decision tables, DFD (physical and logical), Data dictionary-definition, component, advantages , Input and output design, Case studies(at least 4 should be covered) , i/p and o/p design, structure chart.

CHAPTER-4

System design [4]

Cohesion and Coupling, Types of cohesion,Qualities of good design

CHAPTER-5

System testing [8]

Testing and debugging definition, Testing objectives and principles , Performance Testing, User acceptance techniques, Stress testing ,Test data generators.

CHAPTER-6

System maintenance [4]

Importance of maintenance, Software maintenance, Types of maintenance, Maintenance side effects, Reverse engineering, Re-engineering

CHAPTER-7

Concept of software management [6]

The software crisis, Principles of software engineering, Programming in small vs. programming in large, Software measurement.

CHAPTER-8

Project management [7]

Relationship of life cycle, project planning , project control, project organization

Risk management, cost models, configuration management , version control, quality assurance, Metrics.

(Only concepts should be taken for following topics. Configuration management, version control, quality assurance)

Reference Books :

1. Software Engineering – Pressman
2. Analysis and Design of Information System – James Senn
3. System Analysis and Design – Parthsarthy – Khalkar.

Notes:

1. For chapter 3 case study should be taken for internal evaluation :
   a. DFD up to 2nd level
   b. i/p and o/p design
   c. Structure chart
2. For types of cohesion assignments must be taken on only four types.

CA- 303 : Software Engineering

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage in terms of Marks
1 : Introduction To Software Engineering	4	6
2 : Software Development process	10	16
3 : Analysis and design tools	7	12
4 : System design	4	6
5 : System testing	8	12
6 : System maintenance	4	6

7 : Concept of software management	6	10
8 : Project management	7	12

Paper Pattern for Software Engineering Paper for Credit Base System

Question No.	Marks
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

Notes :

1 For chapter 3 case study should be taken for internal evaluation :
a. DFD up to 2nd level
b. i/p and o/p design
c. Structure chart
2 For types of cohesion assignments must be taken on only four types.
3 DFD examples can be asked in university paper

CA-304: JAVA

Prerequisites:

1. Knowledge C programming language.

Objectives:

1. Understanding basic concepts and structures in java.

Syllabus: **[Total Lectures:48]**

CHAPTER-1 **[1]**

Introduction to Java Language

History and Evolution of Java, OOP Principles, Java Platform, JDK Environment, Java Tools, Java Byte Code, Comparison of C++ and Java

CHAPTER-2 **[3]**

Basic Programming Concepts

Keywords, Data Types, Variables, Operators, Naming Conventions, Type Casting, Control Statements, Arrays

CHAPTER-3 **[12]**

Object Oriented Concepts of Java

Introducing classes and objects, Constructors(All types), Garbage Collection and finalize() method , Inheritance Basics , Types of Inheritance , Implementation of polymorphism : Method Overloading and Method Overriding , Nested and Inner classes, Modifiers and Access Control Specifiers, Final variables, methods and classes, Abstract methods and classes, Interfaces, Creating and Importing Packages, Exception Handling

CHAPTER-4 **[5]**

Java Library

String Handling
- String Constructors
- Special String Operations
- Character Extraction
- String Comparison
- Searching Strings
- Modifying a String
- valueOf()
- StringBuffer

Primitive Type Wrappers
- Number

- Double and Float
- Byte, Short, Integer and Long
- Character
- Boolean
- Void

Utility Classes (Only listed below)

- Math
- StringTokenizer
- Date
- Calender
- GregorianCalender
- Random

CHAPTER-5 [4]

Files and Streams

Exploring java.io package, File, Byte Streams:

- InputStream & OutputStream
- FileInputStream & FileOutputStream
- ByteArrayInputStream & ByteArrayOutputStream
- DataInputStream & DataOutputStream
- PrintStream
- RandomAccessFile

Character Streams

- Reader & Writer
- FileReader & FileWriter
- BufferedReader & BufferedWriter
- CharArrayReader & CharArrayWriter
- PrintWriter

Serialization

- Serializable
- ObjectInput & ObjectOutput
- ObjectInputStream & ObjectOutputStream

CHAPTER-6 [14]

Applets, AWT and Event Handling

Applet Programming

- Applet Basics
- Applet Architecture

- Applet Skeleton
- update() and repaint()
- HTML Applet Tag
- Passing Parameters to an Applet
- Using Status Window

Introducing AWT

- AWT classes
- Windows Fundamentals
- Working with Frame Windows
- Working with Graphics
- Working with Colors and Fonts
- AWT Controls
- Layout Managers
- Menus

Event Handling

- Event Handling Mechanism
- Delegation Event Model
- Event Classes
- Event Listener Interfaces
- Adapter Classes
- Anonymous Inner Classes

CHAPTER-7 **[5]**

Swing

Swing Features, Model View Controller Architecture for Swing, Components & Containers, Swing Controls, JApplet , JFrame, JButton, JCheckBox, JTextField, JTabbedPane, JInternalFrame , JScrollPane,JLabel, JList, JTree, JTable, JDialog, JFileChooser, JProgressBar

CHAPTER-8 **[4]**

Multithreaded Programming

Java Thread Model, The Main Thread, Creating a Thread, Using isAlive() and join(), Thread Priorities, Thread Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads

Reference Book(s):

1. The Complete Reference – Seventh Edition - by Herbert Schildt
2. Core Java (Volume 1 – Fundamentals) Eighth Edition - by Horstman & Cornell
3. Core Java (Volume 2 – Advanced Features) Eighth Edition - by Horstman & Cornell
4. Programming with Java - by Balaguruswamy
5. Java 7 Programming – Black Book - by Kogent Learning Solutions Inc.

CA – 304:Core Java

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Number of lectures	Distribution of marks
Chapter 1 – Introduction to Java Language		2
Chapter 2 – Basic Programming Concepts		6 (4+2)
Chapter 3 – Object Oriented Concepts of Java		18 (5+2+4+5+2) or (5+5+4+4)
Chapter 4 – Java Library		8 (2+2+2+2) or (4+4)
Chapter 5 – Files and Streams		8 (4+4) or (4+2+2)
Chapter 6 – Applet, AWT and Event Handling		20 (5+5+4+4+2) or (2+2+4+4+4+4)
Chapter 7 – Swing		10 (5+5) or (4+4+2)
Chapter 8 – Multithreaded Programming		8 (2+4+4)

Core Java Question Paper format

Marks distribution for each question	Marks	Chapter No
Q1	4	2
	4	3
	2	1
Q2	4	4
	4	7
	2	5
Q3	4	6
	4	4
	2	8
Q4	4	7
	4	8
	2	5
Q5	4	3
	4	6
	2	7
Q6	4	5
	4	4
	2	2
Q7	5	3
	5	6
Q8	5	6
	5	3

CA-305: Lab Course

1. The Lab Course is for 100 marks. Out of which 50 marks are for internal evaluation and 50marks are for practical exam slip.
2. For internal evaluation the distribution of marks is as follows:

Sr.No	Description	Marks
1	Core java assignments	15
2	Operating System assignments	15
3	viva	10
4	Internal Evaluator	10

3. External evaluation:

University of Pune
M.C.A. (Science) Semester-III Practical Examination April/Oct
CS-305 General Laboratory-I (Core Java, OS)
Duration: 3 Hours Maximum marks: 50

Q.1: << Core java program>> [20]

Q.2: << Operating System program>> [20]

Q.3: Lab book [5]

Q.4: Viva [5]

Project (CA-306)

- The project should be done with any technology.
- Internal evaluation should be done weekly by respective project guide.
- Students should prepare project report on A4 size paper with font 12 for Normal text and font-size 14 for heading and page title.
- Students should prepared one hard copy and one soft copy of project report

Evaluation for Internal (50-Marks):

Sr.No	Description	Marks
1	Analysis and Design Document(ER,DFD)	**10**
2	First Demo	**15**
3	Second Demo	**15**
4	Presentation	**10**

Evaluation for External (50-Marks):

Sr.No	Description	Marks
1	Demo	**20**
2	Report	**10**
3	Presentation	**10**
4	Viva	**10**

CA-307: Numerical Methods

Prerequisites:

Basic knowledge of mathematics

Objectives:

Understanding Computer Based Numerical and Statistical Techniques.

Syllabus: **[Total Lectures:48]**

CHAPTER-1

Errors **[02]**
Accuracy of Numbers, Errors

CHAPTER-2

Algebraic and Transcendental Equation **[05]**
False Position Method , Newton-Raphson Method

CHAPTER-3

Calculus of Finite Differences **[10]**
Differences, Forward Differences , Backward Differences, Central Differences, Other Differences, Properties Differences, Relation between Operators, Fundamental Theorem on Differences of polynomial, Estimation of Error by Difference Table , Technique to determine Missing Term

CHAPTER-4

Interpolation with Equal Interval **[10]**
Newton's Gregory Formula for Forward interpolation, Newton's Gregory Formula for Backward interpolation, Central Difference Formulae, Gauss Forward Difference Formula, Gauss Backward Difference Formula

CHAPTER-5

Interpolation with Unequal Interval **[08]**

Lagrange's Interpolation Formula, Divided Difference , Newton' Divided Difference Formula

CHAPTER-6

Numerical Integration **[06]**

General Quadrature Formula , Trapezoidal Rule , Simpson's one Third Rule , Simpson's Three –Eight Rule, Euler-Maclaurin's Formula,

CHAPTER-7

Numerical Solution of Ordinary Differential Equation **[07]**

Euler's Method , Euler's Modified Method , Runge- Kutta Method

Text Book-

A textbook of Computer Based Numerical and Statistical Techniques, by A.K. Jaiswal and Anju Khandelwal. New Age international Publishers.

Reference Books –

1. S.S. Sastry ; introductory Methods of Numerical Analysis , 3rd edition, prentice hall of India,1999
2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.
3. K.E. Atkinson; An Introduction to Numerical Analysis, Willey Publications.
4. Balguruswamy; Numerical Analysis

CA- 307: Numerical Methods

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage Marks
1 : Errors	2	4
2 : Algebraic and Transcendental Equation	5	8
3 : Calculus of Finite Differences	10	17
4 : Interpolation with Equal Interval	10	17
5 : Interpolation with Unequal Interval	8	12
6 : Numerical Integration	6	10
7 : Numerical Solution of Ordinary Differential Equation	7	12

Paper Pattern for Numerical methods Paper for Credit Base System

Question No	Marks
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-308: Multimedia Systems (Elective)

Prerequisites:

1. Introductory knowledge and digital images and videos.

Objectives:

1. To understand concept of multimedia, synchronization, application of multimedia.
2. To learn data hiding with images and video.

Syllabus: **[Total Lectures: 48]**

CHAPTER-1

Introduction: Multimedia, Image and Documents **[07]**

Introduction: Definitions of multimedia, Bit/pixel,2. Image type/Format of images, Basic steps for Image Processing, Color Management System(CMS), Multimedia Documents: i) Document, ii) Architecture of document, iii) designing multimedia Interchange Format, SGML, MHEG, HyTime, OMF.

CHAPTER-2

Digital Audio Representation and processing [07]

Uses of Audio in computer applications, Digital Representations of sound, Transmission of digital sound, Digital Audio signal Processing

CHAPTER-3

Digital Video and Image Compression [12]

Text Compression: Compression Principles – Source Encoder and Destination Decoder, Lossless and Lossy Compression, Entropy Encoding, Source Encoding. Text Compression – Static and Dynamic Huffman Coding, Arithmetic Coding. Image Compression: Graphics Interchange Format (GIF), Tagged Image File Format (TIFF),Digitised Documents, JPEG.

Audio Compression: Differential Pulse Coded Modulation (DPCM), Adaptive Differential PCM (ADPCM), Adaptive Predictive Coding and Linear Predictive Coding, MPEG Audio Coding.

Video Compression: Principles, H.261 Video Compression, MPEG 1, MPEG 2 and MPEG 4. Compression – Static and Dynamic Huffman Coding, Arithmetic Coding. Standardization of algorithms

CHAPTER-4

Time Based Media Representation and Delivery [02]

Models of time, Time and Multimedia Requirements, Support for System timing Enforcement – Delivery

CHAPTER-5

Middle Systems Services Architecture [03]

Goals of Multimedia Systems Services, Some views of the Multimedia Systems Services Architecture, Media Stream Protocol, Audio and Video Capture with Synchronized Play

CHAPTER-6

Multimedia Interchange [05]

QuickTime Movie File (QMF) format, OMFI, MHEG (Multimedia and Hypermedia Information Encoding Expert Group), Format Function and Representation Summery, Track model and Object Model, Real-Time Interchange, Towards a Performance Model

CHAPTER-7

Synchronization [04]

Notion of Synchronization, Multimedia Systems, Basic Synchronization Issues, Intra-and Inter-Object Synchronization, Presentation Requirements, The Synchronization Reference Model, Case Study- HyTime, Synchronization in MHEG

CHAPTER-8

Multimedia Applications [04]
Inter- personnel Communication, Interactive Applications over the Internet, Entertainment Applications and Multimedia Conferencing.

CHAPTER-9

Data Hiding For Image and Video [04]

Data Hiding in Binary Image: Proposed Scheme – Applications-Robustness and Security considerations-Multilevel embedding- Multilevel image data hiding: Spectrum

Partition- System Design-Refined Human visual model Multilevel video data hiding: Embedding Domain-System Design.

Reference Books

1. Chapman, Nigel and Chapman, Jenny. "Digital Multimedia". 2000. John Wily & Sons.
2. Steinmaetz, Ralf and Nahrstedt, Klara. Multimedia : "Comunications and Applications". 2003. Pearson Education.
3. Min Wu, Bede Liu, "Multimedia Data Hiding", Springer-Verlag NewYork Inc., 2002.
4. Multimedia Systems - John F. Koegel Buford
5. Multimedia in Practice - Jeffcoate.
6. Principles of Multimedia by Ranjan Parekh

TEXT BOOK:

1. Halshall, Fred. "Multimedia Communications – Applications, Networks, Protocols and Standards". 2001. Pearson Education.

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CA 308 : Multimedia

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage Marks
1 : Introduction: Multimedia, Image and Documents	8	14(4+4+4+2)
2 : Digital Audio Representation and processing	8	14(4+4+4+2)
3 : Digital Video and Image Compression	12	22(5+5+4+4+4)
4 : Time Based Media Representation and Delivery	2	4(2+2/4)
5 : Middle Systems Services Architecture	3	4
6: Multimedia Interchange	5	7(5+2)
7 : Synchronization	4	5
8 : Multimedia Applications	4	5
9 : Data Hiding For Image and Video	4	5

Paper Pattern for Multimedia Paper for Credit Base System

Question No	Marks
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-309 Dot Net (Elective)

Prerequisites:

Knowledge of C, C++ programming language

Objectives:

Understanding different concepts in .Net programming and ASP.

Syllabus **[Total Lectures=48]**

CHAPTER-1

Overview of .NET **[3] BOOk3**

Building Blocks of .NET Framework, .NET Compatible Languages, CLS (Common Language Specification), CTS (Common Type System),CLR (Common Language Runtime), Working of CLR, Assembly and Components of Assembly

CHAPTER-2

The C# Programming Language **[3] BOOK 1,2**

Structure of C# Program, Passing Command line arguments, System. Console class, Sytem.Object Class, Value Types and Reference Types, Implicit and Explicit Conversion, Boxing and Unboxing, .NET Enumerations, Method Parameter Modifiers (ref, out and params), Array types, System Data Types, System String DataType

CHAPTER-3

Inheritance and Polymorphism **[4] BOOK 1, 2**

Pillars of Object oriented, Programming, Class and Class Members, Access Modifiers, Constructor, Destructor, Property, Indexer, Methods, Interface, Structure, Inheritance, Polymorphism

CHAPTER-4

Exception Handling **[4] BOOK 1, 2**

Exception Handling, Exception Class, User Defined Exception

CHAPTER-5

Understanding Garbage Collection **[4] BOOK 1, 2**

Memory Management Basics, Garbage Collection, Garbage Collection Phases, Generational

CHAPTER-6

Delegates and Events **[3] BOOK 1, 2**

Delegate, Unicast Delegate, Multicast Delegate, Delegate Chaining, Event

CHAPTER-7

Collection Classes **[2] BOOK 1, 2**

Collections, System. Array Class, Collection Interfaces, Non-Generic Classes, ArrayList

CHAPTER-8

Reflection Late Binding **[2] BOOK 1,2**

Reflection, Sytem.Type Class, System. Reflection Class, Assembly Class, MemberInfo Class, Late Binding,

CHAPTER-9

.NET Assemblies Assembly **[2] BOOK 1,2**

Components of Assembly, Private Assemblies, Shared Assemblies

CHAPTER-10

Threading

Thread Synchronization **[2] BOOK 1,2**

CHAPTER-11 **[3] BOOK2,3**

File I/O and Synchronization

System.IO Namespace, Stream Class, Serialization, Binary Serialization

CHAPTER-12

System.Window s.Forms **[4] BOOK 2,3**

Windows Application,Windows Form Namespace, Form, Common members of Form class, Controls, Properties and Events, Dialog Boxes, Graphics Class

CHAPTER-13

ADO.NET **[4] BOOK 2,3,4**

Data Providers, ADO.NET Components, ADO.NET Objects, ADO.NET Interfaces, Connected and Disconnected architecture

CHAPTER-14

ASP.NET Architecture **[3] BOOK 3**

ASP.NET Architecture, IIS (Internet Information Services), HTTP Pipeline, Postback and ViewState, Page Life Cycle

CHAPTER-15

ASP.NET Controls [2] BOOK 3

HTML Control, Web ServerControl, Validation Control, Rich Web Server Control

CHAPTER-16

State Management and Caching [3] BOOK 3

Client Side, View state,Cookies, Querystring, Server Side, Application variable, Session Variable, Session State Management using SQL Server, Caching

Reference Books:

1. InsideC#byTomArcherandAndrewWhitechapel
2. ProfesionalC#2005/2008byWroxPublication
3. ProfesionalASP.NET2005/2008byWroxPublication
4. Database Programming with C#, By Carsten Thomsen, Apress

CA – 309 : Dot Net

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter no	No of lectures	Weightage in terms of Marks
1 : Overview of .NET	3	5
2 : The C# Programming Language	3	5
3 : Inheritance and Polymorphism	4	6
4 : Exception Handling	4	6
5 : Understanding Garbage Collection	4	6
6 : Delegates and Events	3	5
7 : Collection Classes	2	4
8 : Reflection Late Binding	2	4
9 : .NET Assemblies Assembly	2	4
10 : Threading	2	4
11 : File I/O and Synchronization	3	5
12 : System.Windows.Forms	4	6

13 : ADO.NET	4	6
14 : ASP.NET Architecture	3	5
15 : ASP.NET Controls	2	4
16 : State Management and Caching	3	5

Paper Pattern for Multimedia Paper for Credit Base System

Question No	Marks
Q1	4
	4
	2
Q2	4
	4
	2
Q3	4
	4
	2
Q4	4
	4
	2
Q5	4
	4
	2
Q6	4
	4
	2
Q7	5
	5
Q8	5
	5

CA-401: Computer Graphics

Syllabus **Total Lecture [48]**

Pre – Requisites

1. Computer programming skills in C programming language
2. Basic understanding of use of data structures
3. Basic Mathematical concepts related to matrices and geometry

Objectives

1. To study how graphics objects are represented in Computer
2. To study how graphics system in a computer supports presentation of graphics information
3. To study how interaction is handled in a graphics system
4. To study how to manipulate graphics object by applying different transformations
5. To provide the programmer's perspective of working of computer graphics

CHAPTER 1

Introduction to Computer graphics **[4]**

Introduction to computer graphics & graphics systems, Four components of Computer Graphics Representation, Presentation , Interaction and Transformations,Uses of Computer Graphics, Graphics Primitives – Pixel/Point ,Raster v/s Vector ,RGB color model, intensity, Programming essentials – event driven programming. OpenGL library

CHAPTER II

Input devices and Interaction tasks **[4]**

Essential Functionalities for Interaction – Locator, valuator , pick and choice; Hardware used for interaction – Input devices – keyboard, mouse, trackball, tablets, light pen;Basic Interaction tasks – Position, Selection

CHAPTER III

Presentation and Output devices **[4]**

Presentation Graphics - frame buffer, display file, lookup table;Display devices, Random and Raster scan display devices; CRT, Plotters and Printers

CHAPTER IV

Point, Line and Polygon primitives **[10]**

Scan conversions, run length encoding , Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm;4.3 Scan converting polygons, fill algorithms, Boundary fill algorithm, flood fill algorithm

CHAPTER V

2D Transformations and viewing **[10]**

Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, Reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline; Window to viewport co-ordinate transformation , clipping operations , point clipping , line clipping; Cohen Sutherland algorithm, Midpoint subdivision algorithm, Cyrus beck algorithm; Polygon clipping , Sutherland Hodgman algorithm, Weiler-Atherton Algorithm

CHAPTER VI

3D transformation & viewing **[4]**

3D transformations: translation, rotation, scaling & other transformations; Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; Three dimensional viewing, Parallel and Perspective projections

CHAPTER VII

Curves and Surfaces **[6]**

Polygon meshes, Representing polygons; Parametric curves, Hermite Curves, Bezier curves, B-spline curves

CHAPTER VIII

Hidden surfaces Elimination **[6]**

Depth comparison, Z-buffer algorithm, Back face detection; BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal – geometry; Color & shading models Light & color model; interpolative shading model; Texture;

Text Books:

1. Hearn, Baker – " Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Foley, Vandam, Feiner, Hughes – "Computer Graphics principles (2nd Ed.) – Pearson Education.

Reference Books:

1. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – TMH.
2. D. F. Rogers, J. A. Adams – " Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH
3. F. S. Hill, Stephen Kelly, Computer Graphics using OpenGL, PHI Learning
4. Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH

CA-402: SDK

Syllabus **Total Lecture [50]**

Pre – Requisites

1. User level knowledge of Windows OS
2. Working Knowledge of C

Objectives

1. To understand the Windows programming environment
2. To study Windows programming concepts like messages and queues
3. To study Text input and output
4. To understand how user input and output is facilitated via input-output devices, various Windows controls and menus
5. To understand advanced concepts like multitasking, database connectivity and dynamic linked library

CHAPTER-1

Getting Started **[2]**

Aspects of Windows, Dynamic Linking, Windows Programming Options, APIs and Memory Models, Language Options, The Programming Environment, API Documentation, Your First Windows Program, A Character-Mode Model, The Windows Equivalent, The Header Files, Program Entry Point, The MessageBox Function, Compile, Link, and Run.

CHAPTER-2

An Introduction to Unicode **[2]**

Unicode to the Rescue, Wide Characters and C, The char Data Type, Wider Characters, Wide-Character Library Functions, Maintaining a Single Source, Wide Characters and Windows, Windows Header File Types, The Windows Function Calls, Windows' String Functions, Using printf in Windows, A Formatting Message Box.

CHAPTER-3

Windows and Messages **[4]**

A Window of One's Own, An Architectural Overview, The HELLOWIN Program, Thinking Globally, Registering the Window Class, Creating the Window, Displaying the Window, The Message Loop, The Window Procedure, Processing the Messages, Playing a Sound File, The WM_PAINT Message, The WM_DESTROY Message, Queued and Nonqueued Messages.

CHAPTER-4

An Exercise in Text Output [3]

Painting and Repainting, The WM_PAINT Message, Valid and Invalid Rectangles, An Introduction to GDI, The Device Context, Getting a Device Context Handle: Method One, The Paint Information Structure, Getting a Device Context Handle: Method Two, TextOut: The Details, The System Font, The Size of a Character, Text Metrics: The Details, Formatting Text, The Size of the Client Area, Scroll Bars, Scroll Bar Range and Position, Scroll Bar Messages.

CHAPTER-5

Basic Drawing [4]

The Structure of GDI, The GDI Philosophy, The GDI Function Calls, The GDI Primitives, Other Stuff, The Device Context, Getting a Device Context Handle, Getting Device Context Information, Drawing Dots and Lines, Setting Pixels, Straight Lines

CHAPTER-6

The Keyboard [3]

Keyboard Basics, Ignoring the Keyboard, Who's Got the Focus?, Queues and Synchronization, Keystrokes and Characters, Keystroke Messages, System and Nonsystem Keystrokes, Virtual Key Codes, The lParam Information, Shift States, Using Keystroke Messages, Character Messages, The Four Character Messages, Message Ordering, Control Character Processing, The Caret (Not the Cursor), The Caret Functions.

CHAPTER-7

The Mouse [2]

Mouse Basics, Some Quick Definitions, The Plural of Mouse Is..., Client-Area Mouse Messages, Mouse Double-Clicks, Nonclient-Area Mouse Messages, The Hit-Test Message, Messages Beget Messages, Capturing the Mouse, The Capture Solution.

CHAPTER-8

The Timer [2]

Timer Basics, The System and the Timer, Timer Messages Are Not Asynchronous, Using the Timer: Three Methods: Method One, Method Two, Method Three.

CHAPTER-9

Child Window Controls [6]

The Button Class, Creating the Child Windows, The Child Talks to Its Parent, The Parent Talks to Its Child, Push Buttons, Check Boxes, Radio Buttons, Group Boxes, Changing the Button Text, Visible and Enabled Buttons, Buttons and Input Focus, The Static Class, The Scroll Bar Class, The Edit Class, The Edit Class Styles, Edit Control Notification, Using the Edit Controls, Messages to an Edit Control, The Listbox Class, List Box Styles, Putting Strings in the List Box, Selecting and Extracting Entries, Receiving Messages from List Boxes, A Simple List Box Application, Listing Files, A head for Windows.

CHAPTER-10

Menus and Other Resources [4]

Menus, Menu Concepts, Menu Structure, Defining the Menu, Referencing the Menu in Your Program, Menus and Messages, A Sample Program, Menu Etiquette, Using the System Menu, Changing the Menu, Other Menu Commands, Keyboard Accelerators, Why You Should Use Keyboard Accelerators, Some Rules on Assigning Accelerators, The Accelerator Table, Loading the Accelerator Table, Translating the Keystrokes, Receiving the Accelerator Messages.

CHAPTER-11

Dialog Boxes [4]

Modal Dialog Boxes, Creating an "About" Dialog Box, The Dialog Box and Its Template, The Dialog Box Procedure, Invoking the Dialog Box, Modeless Dialog Boxes, Differences Between Modal and Modeless Dialog Boxes

CHAPTER-12

The Clipboard [3]

Simple Use of the Clipboard, Memory Allocation, Transferring Text to the Clipboard, Getting Text from the Clipboard, Opening and Closing the Clipboard

CHAPTER-13

ODBC [3]

Header Files used for ODBC, ODBC Architecture, Variables used for ODBC, ODBC APIs, ODBC Connection Program

CHAPTER-14

The Multiple-Document Interface [3]

MDI Concepts, The Elements of MDI, MDI Support

CHAPTER-15

Multitasking and Multithreading [2]

Modes of Multitasking, Nonpreemptive Multitasking, Windows Multithreading, Thread Synchronization, The Critical Section, Event Signaling, The Event Object, Thread Local Storage.

CHAPTER-16

Dynamic-Link Libraries [2]

Library Basics, Library: One Word, Many Meanings, A Simple DLL, Shared Memory in DLLs, The Library Entry and Exit Point, Miscellaneous DLL Topics, Dynamic Linking Without Imports, Resource-Only Libraries

CHAPTER-17

A Taste of the Internet [1]

Windows Sockets, Sockets and TCP/IP, Network Time Services, WinInet and FTP, Overview of the FTP API

Textbook(s):

1. Programming Windows®, Fifth Edition, by Charles Petzold, Microsoft
2. ODBC Programmer's Reference, MSDN

CA-403: Advanced JAVA

Syllabus **Total Lecture [48]**

Pre – Requisites

1. Knowledge of core Java (CA-304)

Objectives

1. To understand java concepts for database programming, use of collections and networking
2. To study web development concepts using servlets, JSP and JavaBeans

CHAPTER-1

Database Programming **[10]**

The design of JDBC, jdbc configuration, Types of drivers, Executing sql statements, query execution, Batch execution, Scrollable and updatable result sets, Rowset,Metadata, transactions.(Databases : Mysql/ SQL Server/ PostgreSQL/Oracle/MS-Access)

CHAPTER-2

Collections **[6]**

Collections, Introduction to the Collection framework (Interfaces, Implementation and algorithms), Interfaces, collection classes : Set, List, Queue and Map, Set : HashSet, TreeSet, and LinkedHashSet,Interfaces such as Lists, Set, Vectors, Stack, LinkedList, Comparator, Iterator, Enumerators, hash tables, Working with Maps: Map Interface and Map classes

CHAPTER-3

Networking **[7]**

The java.net package, Connection oriented transmission – Stream Socket Class, Internet Addressing , Inet Address, Factory methods , Instance methods,TCP/IP client socket, TCP/IP Server sockets, Creating a Socket to a remote host on a port (creating TCP client and server), URL, URL Connection, Datagrams , Developing small application with sockets.

CHAPTER-4

Servlet **[10]**

Introdution to Servlet (HTTP Servlet), Life Cycle of servlet, GenericServlet Class Handing get and post request(HTTP),Data handling using Servlet, Creating cookies, Session tracking using HTTP servlet, Servlet - JDBC,Security Issues.

CHAPTER-5

Web development using JSP [8]

Introduction to JSP, JSP Architecture, JSP Directives, JSP scripting elements, Default objects in JSP, JSP Actions,JSP with Database, Error handling in JSP, Session tracking techniques in JSP, Introduction to custom tags.

CHAPTER-6

JavaBeans Components [7]

What is Bean?, Advantages, Using the Bean Development Kit (BDK), The Bean Writing process ,The Java Beans API, Enterprise Java Beans: Introduction to Enterprise java beans, Types of EJB ,(session bean ,entity bean and message driven bean), Sample program on EJB

Reference Books:

1. Complete reference Java by Herbert Schildt(5th edition)
2. Java 2 programming black books, Steven Horlzner
3. Java servlet Programming by Jason Hunter,O'Reilly
4. Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press.
5. Commercial web development using java 2.0, Ivan Byaross, BPB
6. Enterprise JavaBeans (3rd Edition) by Richard Monson-Haefel, Orelly
7. Book Complete Reference J2EE by Jim Keogh

CA-404 : Object Oriented Software Engineering

Syllabus **Total Lecture [48]**

Pre – Requisites

- Knowledge of Software Engineering (CA-303)

Objectives

- To understand the object oriented modelling and development concepts
- To study UML models
- To study object oriented development process

CHAPTER-1

Object Oriented Concepts and Modeling **[6]**

What is Object Orientation? (Introduction to class, Object, inheritance, polymorphism), Model & Domain, Importance of Modeling, Principles of Modeling, Object Oriented Modeling

CHAPTER-2

Object Oriented System Development **[2]**

Introduction to Function/data, Object Oriented Analysis, Object Oriented Design, Object Oriented Testing

CHAPTER-3

Introduction to UML **[3]**

Overview of UML, Conceptual Model of UML, Architecture, S/W Development Life Cycle

CHAPTER-4

Basic and Advanced Structural Modeling **[6]**

Classes, Relationship, Common mechanism, Diagrams, Class Diagrams, Interfaces, Types, and Roles, Packages, Instances, Object diagrams

CHAPTER-5

Basic Behavioral Modeling **[4]**

Interactions, Use cases, Use case diagram, Interaction diagram, Activity Diagram, State Chart diagram

CHAPTER-6

Architectural Modeling & Re-Engineering [4]

Components, Component diagram, Deployment diagram, Reverse Engineering, Forward Engineering

CHAPTER-7

Object Oriented Analysis [4]

Inception, Categories of Requirement, Use case model, Actor, Kinds of Actor, Use cases in Iterative Method, Elaboration, Construction, Transition

CHAPTER-8

Object Oriented Design [6]

Generic components of OO Design model, System Design process, Partitioning the analysis model, Concurrency and subsystem allocation, Task Mgmt component, Data Mgmt component, Resource Mgmt component, Inter sub-system communication, Object Design process, Introduction to Design Patterns

CHAPTER-9

Object Oriented Testing [4]

Overview of Testing and object oriented testing, Types of Testing, Object oriented Testing strategies, Test case design for OO software, Inter class test case design

CHAPTER-10

Iterative, Evolutionary and Agile [5]

Unified Process, Rational Unified Process, UP Phases, UP Disciplines, Agile UP, Agile Methods and Attitudes, Agile Modeling

CHAPTER-11

Case Studies Using UML. [4]

Text Books:

1. The Unified Modeling Language User Guide by Gr.Booch, Rumbaugh, Jacobson
2. The Unified Software Development Process by Ivar Jacobson, Booch, James Rumbaugh
3. Applying UML and Patterns by Craig Larman

Reference Books:

1. UML in NutShell by O'Reilly
2. Object Oriented Software Engineering by Ivar Jacobson

CA-405: Lab Course

4. The Lab Course is for 100 marks. Out of which 50 marks are for internal evaluation and 50marks are for practical exam slip.
5. For internal evaluation the distribution of marks is as follows:
   a. For Graphics and SDK mini projects must be assigned to students in group of min.2 and max. 3 by respective teacher guide.
   b. For internal evaluation practical exam should be conducted by respective teachers.

Sr.No	Description	Marks
1	Graphics assignments	10
2	SDK assignments	10
3	Advanced Java assignments	10
4	Internal evaluation	10
5	Viva	10

6. External evaluation:
   a. External examiner should evaluate the project with demo.

Clarification for Extended Profile- 1.1 List of Courses offered across all programs during last five years.

Course Catalog for M. C. A. (Science) Program

University of Pune

M.C.A. (Science) Sem-IV Practical Examination April/ Oct

CS-405 General Laboratory-II (Advanced Java, Graphics, SDK)

Duration: 3 Hours | Maximum marks: 50

Q.1: Evaluation of Graphics mini project by external examiner	[10]
Q.2: Evaluation of SDK mini project by external examiner	[10]
Q.3: <<Advance Java program >>	[20]
Q.4: Lab book	[05]
Q.5: Viva	[05]

CA-406 : Project

- The project can be Language independent, platform independent, Technology independent.
- Project should be based on real life Problem.
- Internal evaluation should be done weekly by respective project guide.
- Students should prepare project report on A4 size paper with font 12 for Normal text and font-size 14 for heading and page title.
- Students should prepared one hard copy and one CD of project report.

Evaluation for Internal (50-Marks):

Sr.No	Description	Marks
1	Analysis and Design Document(ER,UML)	10
2	First Demo	15
3	Second Demo	15
4	Presentation	10

Evaluation for External (50-Marks):

Sr.No	Description	Marks
1	Demo	20
2	Report	10
3	Presentation	10
4	Viva	10

CA-407: Cyber Law

Syllabus **Total Lecture [48]**

CHAPTER-1

Introduction to Cyber Law **[5]**

Meaning, Nature &Scope of Cyber Laws, Objectives of Cyber Law, Salient features of IT Act,

CHAPTER-2

Cyber Crime & Information Technology Act, 2000 **[25]**

Extent & Application of IT Act , Definitions, Digital & Electronic Signature, Electronic Governance, Attribution, Acknowledgement & Dispatch of Electronic Record , Security Concerns & Preventive Measures, Various Authorities under IT Act , Penalties, Compensation & Adjudication, Offences & Criminal Investigation Procedure .

Impact of IT Act on other Related Acts :i) Amendments to Indian Penal Code, 1860 (Sec.354,354A,354B,354D,415,417,463,464,466,468,469,470,471,476,477A,499 &500) , ii)Amendments to Indian Evidence Act,1872(Sec.3,17,22,34,35,39,47, 61,62,65A,65B,67A,73A,81A,85A,85B,88A 90A & 131)Am c) Amendments to Bankers Books Evidence Act,1891 (Sec.2)

CHAPTER-3

Intellectual Property Rights and Cyber Law **[13]**

Meaning of Intellectual Property, Need of Protection of Intellectual Property, Meaning of Copyright & Trade Mark, Acquisition of Copyright & Trade Mark, Remedies for Infringement of Copyright& Trade Mark, Intellectual Property Rights in Cyber Space Domain Name Dispute, Cyber Squatting & Typo squatting , Linking, In-line Linking, Framing

CHAPTER-4

Case Study **[05]**

Yahoo case, Gold Case, Napster Case, Griffis Case

Reference Books:

1. **Cyber Laws**by Justice Yatindra Singh
   Universal Law Publishing Co. New Delhi
   (Ph No.011-47082254, 27438103, 27215334)

2. **Cyber Laws & E-commerce Laws**by P.M. Bakshi & R.K.Suri
   Bharat Publishing House, New Delhi
   (Ph.No. 011-7910001-03)

3. **Intellectual Property Rights & the Law**byDr. G.B. Reddy
   Gogia Law Agency, Hyderabad
   (Ph.No. 040-24525689 24560631, 66730500)

4. **Bare Text**
   Indian Penal Code, 1860
   Indian Evidence Act, 1872
   Bankers Books Evidence Act,1891

CA-408 : Soft Computing

Syllabus **Total Lecture [50]**

CHAPTER-1

Introduction to Soft Computing: **[1] Book 1**

What is soft computing, Principle of soft computing (SC Paradigm), How is it different from hard computing, Constituents of SC (Fuzzy Neural, Machine Learning, Probabilistic reasoning)

CHAPTER-2

Fuzzy Logic - Classical Sets and Fuzzy Sets: **[3] Book 1, 2**

Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets: cardinality, operations

CHAPTER-3

Classical Relations and Fuzzy Relations: **[2] Book 1, 2**

Cartesian Product, Classical relations – Cardinality, operations, Properties, composition, Fuzzy Relations - Cardinality, operations, Properties, composition, Max product

CHAPTER-4

Membership functions: **[4] Book 1, 2**

Features of membership functions, standard forms and boundaries, fuzzification methods, problems on Inference method of fuzzification

CHAPTER-5

Fuzzy to Crisp conversions: **[4] Book 1, 2**

Fuzzy Tolerance and equivalence relations, lambda (alpha) cuts for fuzzy sets and relations, Defuzzification methods – Max-membership, centroid, weighted average method, mean-max membership, center of sums, center of largest area, first of maxima

CHAPTER-6

Fuzzy Arithmetic and Fuzzy Numbers: **[2] Book 1, 2**

Fuzzy Arithmetic, Fuzzy numbers, Extension Principle

CHAPTER-7

Logic and fuzzy systems: **[4] Book 2**

Fuzzy Logic, Approximate reasoning, Fuzzy Implication, Fuzzy systems

CHAPTER-8

Fuzzy Rule based Systems: **[4] Book 1, 2**

Linguistic Hedges, Aggregation of fuzzy Rules

CHAPTER-9

Artificial Neurons, Neural Networks and Architectures: [2] Book 3

Neuron abstraction, Neuron signal functions, Definition of Neural Networks, Architectures: feedforward and feedback, Salient properties and application domains

CHAPTER-10

Binary Threshold neurons: **[6] Book 3**

Convex sets, hulls and linear separability, Space of Boolean Functions, Binary neurons, Pattern dicotomizers, TLN's, XOR problem

CHAPTER-11

Perceptrons and LMS: **[14] Book 3**

Learning and memory, Learning Algorithms, Error correction and gradient descent rules, The learning objectives for TLNs, Pattern space and weight space, Perceptron learning algorithm, Perceptron convergence algorithm, Perceptron learning and Non-separable sets, α-Least Mean Square Learning, MSE Error Surface and its Geometry, Steepest Descent Search with Exact Gradient Information, μ-LMS: Approximate Gradient Descent, Backpropagation Learning algorithm, Difference between α-LMS and μ-LMS,Applications of Neural Networks ,Pattern Recognition and classification

CHAPTER-12

Genetic Algorithms (GA): **[4] Book 1, 4**

What are GA's, Why GA's? Brief introduction to traditional optimization and search techniques, GA and search space, Steps in GA, Operators in GA, Genetic Algorithms Vs. Traditional Methods, Basic terminologies in GA, Schema Theorm, Problem solving using GA, Application of Genetic Algorithm: Travelling salesman problem

Reference Books

1. Principles Of Soft Computing (With CD)by S. N. Sivanandam, S. N. Deepa, Wiley India, ISBN:9788126527410

2. Fuzzy Logic: With Engineering Applications by Timothy J Ross, Wiley India, Third Edition ISBN : 978-81-265-3126-4
3. Neural Networks: A Classroom Approach,1/e by Kumar Satish, TMH, ISBN:9780070482920, 2008 reprint
4. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg, Pearson Education, ISBN:81-7808-130-X

CA-409: Artificial Intelligence

Syllabus **Total Lecture [48]**

CHAPTER-1

Introduction to Artificial Intelligence [2]

What is AI?
Early work in AI
AI and related fields
AI problems and Techniques
(Book 1: Pgs:4-22 OR Book 2: Pgs 3-27)

CHAPTER-2

Problems, Problem Spaces and Search [6]

Defining AI problems as a State Space Search: example
Production Systems
Search and Control Strategies
Problem Characteristics
Issues in Design of Search Programs
Additional Problems
(Book 1: Pgs. 25-47 OR Book 2: 57-82)

CHAPTER-3

Heuristic Search Techniques [8]

Generate-and-test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Mean-Ends Analysis
(Book 1: Pgs. 50-72, Book 2: 83, 92-114)

CHAPTER-4

Knowledge Representation [10]

Representations and Mappings, Approaches to Knowledge Representation, Knowledge representation method, Propositional Logic, Predicate logic, Representing Simple facts in Logic, Representing Instances and Isa relationships, Computable Functions and Predicates, Resolution, Forward and backward chaining
(Book 1: 79 - 96, Book 2: 217-264, 265-311, 323)

CHAPTER-5

Slot – and – Filler Structures [8]

Weak Structures, Semantic Networks, Frames, Strong Structures, Conceptual Dependencies, Scripts
(Book 1 : Pgs 118 - 204, 207-215)

CHAPTER-6

Game Playing [2]

Minimax Search Procedures, Adding alpha-beta cutoffs
(Book 1: 231-239 OR Book 2: 122-139)

CHAPTER-7

Planning [4]

An example Domain: The Blocks world, Component of a planning system, Goal stack planning, Nonlinear planning ,Hierarchical Planning
(Book 1: 250 – 268 OR Book 2 :343-349, 359, 371-391)

CHAPTER-8

Learning [2]

What is learning, Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation based learning
(Book 1: 347-365 OR Book 2: 525-532, 629-632)

CHAPTER-9

Introduction to AI Programming Language [6]

PROLOG: Introduction to TURBO PROLOG, PROLOG variables, Simple Input and Output, Basic Rules of Recursion, Arithmetic Operations
(Book 4)

Reference Books:

1. Artificial Intelligence, Tata McGraw Hill, 2nd Edition, by Elaine Rich and Kevin Knight
2. Artificial Intelligence: A Modern Approach by Stuart Russell, Peter Norvig, Prentice Hall, ISBN 0-13-103805-2
3. Introduction to Artificial Intelligence and Expert System, Prentice Hall of India Pvt. Ltd., New Delhi, 1997, 2nd Printing, by Dan Patterson.
4. .Introduction to TURBO PROLOG, BPB Publication, by Carl Townsend

Circular for Course Code 392, 394, 492, 494

Savitribai Phule Pune University

Dr. V. B. Gaikwad

Director

Board of College & University Development

Ganeshkhind, Pune [illegible]

[illegible] 25698007

[illegible]

Ref. No.: 299

Date: 25.11.2014

To,

Hon. Principals/Directors of all affiliated colleges of Arts, Commerce, Science, Law and Management.

Subject: Guidelines regarding evaluation of skill-based courses of 4 credits incorporated in the syllabi of post-graduate degree programmes with effect from June 2014.

Dear Sir/ Madam,

Skill-based training courses of 4 credits have been already incorporated in the syllabi of Post graduate degree curricula of Savitribai Phule Pune University after the approval from academic council vide approval no. [illegible]. We, hereby, would like to give the guidelines for the evaluation of these courses. It should be noted that :

1.It will be **internal constintent evaluation** and will be carried over a period of two years PG degree programme.

2.College may conduct the first term end examination for this year in January 2015 and final test at the time of yearly examination for the students appearing for part II of the PG degree course.

3.However, for the students appearing for part I, evaluation can be carried out as per given components throughout two years of PG degree course.

4.The final marklists of Part II students of all components of evaluation i. e. written test I and II and practical work should be sent to Savitribai Phule Pune University.

Guidelines are attached herewith. Please kindly take a note and do the needful.

Dr.V.B.Gaikwad,
Director.BCUD,

Guidelines for Evaluation of Skill-based Courses of 4 Credits

From the academic year 2014-15, the skill- based courses for 4 credits have been incorporated in the curriculum of Post-graduate degree programmes of Savitribai Phule Pune University.

Evaluation comprises of the *Internal Assessment* on the basis of following components:

Table No. 1: Components of Evaluation

Sr. No.	Evaluation Head	Marks
1.	Skill-based practical work	60
2.	Written Test I	20
3.	Written Test II	20
	Total Marks	100

I. Evaluation of Skill-based Practical work:

Course- related skill-based practical work will be entirely based on the skills to be developed in the students. It may include the topics as has been prescribed in the syllabi of every course. Practical components may be based on laboratory work, on job industrial training, working with NGO or similar organizations, project, field work, group discussion, presentation etc. *unless otherwise clearly specified* in the given syllabi of all the courses.

College is supposed to maintain the record of marks allotted to the practical work carried out by the students.

The following criteria can be used for designing the tool for evaluation of practical work.

A. For Science and technical subjects:

The criteria as indicated below are suggestive and you may refer to it as a guideline for designing your own tool for evaluation if necessary. However, evaluation of each student for practical work must be done objectively and should be based on actual supervision by the trainer.

Total marks: 60

Table No 2: Evaluation tool for practical work in science and technical subjects:

Sr. No.	*Evaluation Criteria*	*Marks out of*	*Excellent (10)*	*Very good (8)*	*Good (6)*	*Satisfactory (4)*	*Needs improvement (2)*
1.	Knowledge of underlying principles	10					
2.	**Level of proficiency acquired in the respective skill:** (each of the following point carries 10 points)						
a	Operational skills related to instruments, machines	10					
b	Procedural skills	10					
c	Precision (accuracy)	10					
d	Adaptation and origination(evolving new creative patterns in specific situations thus proving highly developed skills)	10					
e	Quality of work accomplished	10					
	Total Marks	60					

A. For the faculty of arts, mental, moral and social sciences, education, management, law, commerce: (*Any 6* of the following criteria may be chosen for designing evaluation tool):

Table No. 3: Evaluation tool for practical work in subjects specified as above:

Total marls: 60

Sr. No.	Evaluation criteria	Marks out of	*Excellent (10)*	*Very good (8)*	*Good (6)*	*Satisfactory (4)*	*Needs improvement (2)*
1.	Interpersonal skills	10					
2	Critical thinking	10					
3	Decision making	10					
4	Problem solving	10					
5	Preparing layout of execution plan	10					
6	Effective implementation of plan	10					
7	Presentation	10					
8	Ability to work in social set-up	10					
9	Co-ordination and organizational skills	10					
10	Time management	10					
	Total marks (for any of the above 6 criteria)	(Out of 60)					

II. Term-end examination/ Annual Examination: 20 marks

There will be two written examinations conducted by the college one at the end of each term. College will set the question paper for the skill-based course that has been selected. College has to send a copy of question-paper, model answers and record of students' marks to SPPU. Pattern for the question paper is as follows:

A. **Objective questions** (*8 questions from any of the following or combination of two):* **8 Marks**
   a. Multiple choice questions
   b. Define/ Answer in one sentence/ Name the following:
B. **Descriptive Questions** *(4 questions from any of the following or combination)*: **12 Marks**
   Answer in short/ Short notes/ Give reasons/ Discuss/ Draw diagrams.

Moderation of Internal Assessment by SPPU:

SPPU committee may visit the college for the inspection and moderation of internal assessment work of the Skill-based courses in the month of April with prior notice.

Title: **Environmental Audit**

Eligibility: Bachelor's degree in any Faculty

Objectives: To create awareness of Environment quality

To develop skills in Environmental and Water Auditing

To create manpower in Air and water pollution monitoring

Course Structure: The course is equivalent to 4 credits . The course can be run in any of the foursemesters.

Syllabus:

Environmental Audit: **1 credit...**

Preamble, scope and objectives of environmental auditing, applicability of statuary, Environmental statement audit, contents of EA report, Requirements of Rule 14 for Environmental Audit under Environmental protection Act1986, importance for industries; Concepts of a. Signatory, b. Consumption Audit, c.Pollution audit, d. Hazardous audit, d. Solid waste audit, e. Disposal audit, f. Cost audit,g. Investment audit, h. Voluntary audit.

Water budget and Water audit : **1 credit**

Water input, output, Mass Balance

Occupational safety : **1 credit**

Safety management: General principles of safety management; need for safety humanitarian; economics, legal and social consideration of industrial safety; role ofmanagement in industrial safety; safety managementprinciple and practices. Safety and Housekeeping: Typical accidents due to poor housekeeping; disposal of scrapsand other trade wastes; Prevention of spillage; marking of aisles. Use of colours as an aid for good housekeeping.

Air and water pollution monitoring : **1 credit**

Basics of air and water pollution, major pollutants, Water analysis for physico-chemical characteristics: pH , Electrical Conductivity, hardness, alkalinity, chloride etc. Air sample analysis: NOx, SOx, particulate matter etc.

Methodology: Lectures supplemented with case studies that may include visits.

Assessment: Final assessment by written and group discussion. Skill based assessment will be as per the case study.

Syllabus of T.Y. M.C.A. (Science) Course

Academic Year 2015-16

Syllabus for M.C.A. (Under Science Faculty) in affiliated colleges to Savitribai Phule Pune University

Credit Based System

Course Structure –

DURATION: The entire Programme is a Three year and Six semester full time Programme.
NO. OF COURSES: For first five semesters there will be Six courses. The last semester will be Industrial training/Institutional project and two theory courses.

Salient Features –

1. Each Theory course will be of 4 credits and each Lab. Course (Practical) of 5 credits.
2. Each semester is of 6 courses and 25 credits (This is not applicable for Industrial training in VI semester of M.C.A.).
3. Each regular student will have to appear for all the 25 credits of the respective semester.
4. Student who wishes to take admission to the second year M.C.A should have obtained at least 25 credits out of 50 credits of the First year M.C.A.
5. A student will have to complete at least 75% credits (other than for IT – SemVI) from M.C.A. (Under Science Faculty) syllabus. The remaining 25% credits (other than for IT–SemVI) can be chosen from the courses offered by the other Departments/subjects (other than Computer Science courses) with credits system structure.

Evaluation Rules –

Pattern of Examination

Evaluation of Students:

1) The In-semester and End-Semester examinations will be of 50 marks each.
2) Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.
3) A student cannot register for third semester/fourth semester if s/he fails to complete the minimum of 50% credits of the total credits of two semesters of the first year.
4) Internal marks will not change. Student cannot repeat internal assessment. If student misses internal assessment examination, s/he will have second chance with the permission of the concerned teacher. But it will not be right of the student. It will be the discretion of the concerned teacher and internal departmental assessment committee.
5) There shall be revaluation of answer script of end semester examination, but not of internal assessment papers.

6) Internal assessment (IA) answer scripts may be shown to the concerned student but not end semester answer script.

Internal Assessment (Continuous Assessment): Internal assessment for each course would be continuous and dates for each tutorials/practical tests will be pre-notified in the time table for teaching or placed separately as a part of time table. Department / College Internal Assessment Committee will coordinate this activity

Theory Courses: Conducting written tests should not be encouraged. More focus should be on non-written tests. Students should be encouraged to conduct various academic activities. A teacher must select a variety of the procedures for internal assessment suggested as follows.

a) Mid-term test
b) On-line test
c) Open book test (concerned teacher will decide the allowed books)
d) Tutorial
e) Surprise test
f) Oral
g) Theory Assignments
h) Review of Research paper
i) Seminar presentation
j) Journal/Lecture/Library notes
k) Group Discussion
l) Programming Assignments

Student has to preserve the documentation of the internal assessment except midterm test answer script. It is the responsibility of the student to preserve the documents.

Project Courses : The Project can be platform, Language and technology independent. Project will be evaluated by project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation.

University Examination (UE): End-Semester examination for 50 marks per course would be held as per the scheduled given by University of Pune.

1. If a student fails in a course of any semester then the student can appear only for the End of Semester Examination of the following semester. However he/she can improve the Internal Assessment (continuous assessment) performance in any of the forthcoming semesters in which the course is subsequently conducted and in this case, the student will have to appear for End of Semester Examination also for the said course.
2. The assessment of 17 credits towards VI th semester (Full Time Industrial Training / Institutional project) will be carried out as follows:
   i. A student will inform the department about the joining date of the above mentioned training.
   ii. The student will have to make minimum two presentations, one in the third month and the other at the end of the training programme. These presentations will be considered towards CA.
   iii. The student will have to submit a Dissertation/Report to the department which will be assessed towards course credits.

Award of Class

Grades will be awarded from grade point average (GPA) of the credits.

GPA Rules:

1. The formula for GPA will be based on Weighted Average. The final GPA will not be printed unless a student passes courses equivalent to minimum 150 credit hours (Science). Total credits hours means the sum of credit hours of the courses which a student has passed.
2. A seven point grade system [guided by the Government of Maharashtra Resolution No. NGO – 1298 / [4619] / UNI 4 dt. December 11, 1999 and University regulations] will be followed. The corresponding grade table is attached herewith.
3. If the GPA is higher than the indicated upper limit in the third decimal digit then the student be awarded higher final grade (e.g. a student getting GPA of 4.492 may be awarded 'A')
4. For Semester I, II, III examinations, only the grade points will be awarded for each subject. Final GPA along with final grade will be awarded only at the end of IV semester. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.
5. After the declaration of result, for the improvement of Grade, the student can reappear for the examination of minimum 30 credits worth theory courses.

Grade and Grade Point Average		
Marks	Obtained Grade	Grade Points
100 – 75	'O' Outstanding	06
74 – 65	'A' Very Good	05
64 – 55	'B' Good	04
54 – 50	'C' Average	03
49 – 45	'D' Satisfactory	02
44 – 40	'E' Pass	01
39 and less	'F' Fail	00

Final Grade Points	
Grade Points	Final Grade
5.00 – 6.00	O
4.50 – 4.99	A
3.50 – 4.49	B
2.50 – 3.49	C
1.50 – 2.49	D
0.50 – 1.49	E
0.00 – 0.49	F

Common Formula for Grade Point Average (GPA):

$$GPA = \frac{\text{Total of Grade Points earned} \times \text{Credit hours for each course}}{\text{Total Credit hours}}$$

B Grade is equivalent to at least 55% of the marks

External Students: There shall be no external students.

Setting of Question Paper / Pattern of Question Paper

For core (compulsory) theory courses end semester question papers set by the University of Pune and centralized assessment for theory papers done as per the University guidlines.

Verification / Revaluation

There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. There shall be revaluation of end semester examination, but not of internal assessment.

Completion of Degree Programme

1) As soon as a student obtains 150 credits (completion of Industrial training (IT) and 75% of the credits from the syllabus excluding IT is essential), the student will be deemed to have completed the requirements of the M.C.A.(Science) degree programme.
2) If a student has failed in a course then the said course will not be taken into account for calculating GPA and overall grade. In fact, all the courses in which a student has passed will be taken into account for calculating the GPA and overall grade.
3) The policies and procedures determined by University will be followed for the conduct of examinations and declaration of the result of a candidate

Course Structure MCA (Science) for Affiliated Colleges

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
I Year Sem-I	Core	CA-101	Programming with C	4	4	50	50	100
	Core	CA-102	DBMS	4	4	50	50	100
	Core	CA-103	Mathematical Foundation	4	4	50	50	100
	Core	CA-104	Concrete Mathematics Graph Theory	4	4	50	50	100
	Core	CA-105	Computer Organisation	4	4	50	50	100
	Core	CA-106	Lab on CA-101 & CA-102	4	5	50	50	100

Minimum Credit : 25, Core Subject is compulsory IA- Internal Assessment, UE – University Examination.

P.V.G.'s College of Science, Pune 9

Clarification for Extended Profile- 1.1 List of Courses offered across all programs during last five years.

Course Catalog for M. C. A. (Science) Program

Year/ Semester	Subject	Paper	Title of Paper	Hours/ Week	Credit	% of Assessment		
						IA	UE	Total
I Year Sem-II	Core	CA-201	Data Structures	4	4	50	50	100
	Core	CA-202	TCS	4	4	50	50	100
	Core	CA-203	OOP- C++	4	4	50	50	100
	Core	CA-204	Computer Networks	4	4	50	50	100
	Core	CA-205	ADBMS	4	4	50	50	100
	Core	CA-206	Lab. on CA-201,CA-203 & CA-205	4	5	50	50	100

Minimum Credit : 25 , Core Subject is compulsory. IA- Internal Assessment, UE – University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-III	Core	CA-301	DAA	4	4	50	50	100
	Core	CA-302	Operating System	4	4	50	50	100
	Core	CA-303	Software Engineering	4	4	50	50	100
	Core	CA-304	Java	4	4	50	50	100
	Core	CA-305	Lab. on 302 & 304	4	5	50	50	100
	Elective	CA-306	Project	4	4	50	50	100
	Elective	CA-307	Numerical Methods	4	4	50	50	100
	Elective	CA-308	Multimedia Systems	4	4	50	50	100
	Elective	CA-309	Dot Net	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 29 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Two for Maximum Credit.
IA- Internal Assessment, UE –University Examination.

Clarification for Extended Profile- 1.1 List of Courses offered across all programs during last five years.

Course Catalog for M. C. A. (Science) Program

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-IV	Core	CA-401	Computer Graphics	4	4	50	50	100
	Core	CA-402	SDK	4	4	50	50	100
	Core	CA-403	Advance Java	4	4	50	50	100
	Core	CA-404	Object oriented Software Engineering	4	4	50	50	100
	Core	CA-405	Lab. on 401,402 &403	4	5	50	50	100
	Elective	CA-406	Project	4	4	50	50	100
	Elective	CA-407	Cyber Law	4	4	50	50	100
	Elective	CA-408	Soft Computing	4	4	50	50	100
	Elective	CA-409	Artificial Intelligence	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 33 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Three for Maximum Credit. IA- Internal Assessment, UE –University Examination.

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
II IYear Sem-V	Core	CA-501	Internet Programming	4	4	50	50	100
	Core	CA-502	Principle of Programming Langauges	4	4	50	50	100
	Core	CA-503	Data Mining & Warehousing	4	4	50	50	100
	Core	CA-504	Software Project Management	4	4	50	50	100
	Core	CA-505	Lab. on 501,502 &505	4	5	50	50	100
	Elective	CA-506	Project	4	4	50	50	100
	Elective	CA-507	Image Processing	4	4	50	50	100
	Elective	CA-508	E-Commerce	4	4	50	50	100
	Elective	CA-509	Mobile Computing	4	4	50	50	100

Minimum Credit : 25 , Maximum Credit 33 . Core Subject is compulsory, From elective courses student can select one course for Minimum credit and Three for Maximum Credit. IA- Internal Assessment, UE –University Examination.

Clarification for Extended Profile- 1.1 List of Courses offered across all programs during last five years.

Course Catalog for M. C. A. (Science) Program

Year/ Semester	Subject	Paper	Title of Paper	Hours / Week	Credit	% of Assessment		
						IA	UE	Total
III Year Sem-VI	Core	CA-601	Industrial Training /Institutional project	--	17	25	75	100
	Elective	CA-602	Software Testing & Quality Assurance	4	4	50	50	100
		CA-603	Embedded Systems	4	4	50	50	100
		CA-604	Information Security And Audit	4	4	50	50	100
		CA-605	Cloud Computing	4	4	50	50	100

Core Subject is compulsory. If student had completed 133 credit within Five semesters then no need to select any elective course. Otherwise student should select required elective courses to complete 150 credit.

M.C.A.(Science) Year-III Sem V

CA- 501: Internet Programming

Prerequisites:

- Basics of Operating Systems, Scripting Languages, Networking

Objectives:

- What is PHP? , Server side scripting vs. Client side scripting
- Understand how the client-server model of Internet programming works.
- Understand how Internet programming tasks are accomplished.
- Get the knowledge of Server side Programming Tools

Syllabus:

UNIT - 1: Introduction to Internet Programming
Client <-> Server model, Browsers - Graphical and Hypertext Access to the Internet, HTTP - HyperText Transfer Protocol (how it actually works)

UNIT - 2: Overview of Language Essentials
Data Types, Variables, Embedding PHP into web pages, Arrays, Objects, Strings and functions

UNIT - 3: HTML forms processing
Building a form, Text fields and value, size, maxlength, html buttons, radio, checkboxes, prechecked, Selection lists, Introduction to CGI scripting, Action and Method - GET and POST, Reading files, Reading from other Servers
Security: Filtering Input and Escaping Output

UNIT - 4: Cookies and Sessions
HTTP basics, processing forms, server Information, setting response header, maintaining state

UNIT - 5: Databases
Accessing Databases, PEAR DB Basics

UNIT - 6: XML
Basics of XML, parsing XML, Web services, JSON repsonses

UNIT - 7: Security

Global variables, filenames, file uploads, file permissions, Filtering Input and Escaping Output

UNIT - 8: Graphics

Embedding an image into page, GD extensions, basic concepts, creating and drawing images, images with text, scaling images, color handling

UNIT - 9: Email via Scripts

TEXT BOOKS

- Advance Internat Technologies , Shah Wiley Publication
- Web Technology Black book , Kogent , Wiley Publication
- PHP Programming by orielly series.
- Beginning XML by David Hunter and David Gibbons.

REFERENCES

- PHP Jquery Cookbook by Vijay Joshi, PACKT Publishing
- Core PHP Programming by Leon Atkinson

CA-502: Principles of Programming Languages

Course Prerequisites:
Experience with a procedural language like C
Experience with an OOP language C++, and Java
Basic knowledge of algorithms and data structure concepts.

Objectives:
To understand how language features work.
To develop a greater understanding of the issues involved in programming language design and implementation
To understand design/implementation issues involved with data, data types, control flow, subroutines, parameter passing
To understand concepts of object orientation, data abstraction, and implementation
To introduce several different paradigms of programming using programming languages.

Chapter 1: Introduction
Programming Languages and Paradigms, Programming language spectrum, Programming Environments

Chapter 2 : Functional Programming Language
Basic LISP Primitives, Procedure definition and binding, Predicates and Conditional, Procedure Abstraction and Recursion

Chapter 3 : Programming language based on Logic (Turbo Prolog)
Introduction, Facts, Objects and Predicates, Variables, Using Rules, Input and Output, Controlling execution – fail, repeat and cut predicate, Arithmetic operations, Compound objects, Dynamic database, Lists, Strings, Files

Chapter 4 :Names, Scopes, and Bindings
The Notion of Binding Time, Object Lifetime and Storage Management, Scope Rules, The meaning of Names in a Scope, The Binding of Referencing Environments, The Binding of Referencing Environments, Macro Expansion

Chapter 5 : Data Types
Introduction, Primitive Data Types, Character String Types, User defined Ordinal types- Enumeration & Subrange types, Array types, Associative Arrays, Record types, Union Types, Pointer and Reference Types

Chapter 6 : Control Flow
Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion

Chapter 7: Subprograms and Implementing subprograms
Fundamentals of subprograms, Design issues for subprograms, Local referencing environments, Parameter passing methods, Parameters that are subprograms, Overloaded subprograms, Generic subprograms, Design issues for functions, User-Defined overloaded operators, Co-routines, Semantics of Calls and Returns, Implementing "Simple" Subprograms , Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Chapter 8: Data Abstraction and Object Orientation
Object-Oriented Programming, Encapsulation and Inheritance, Initialization and Finalization, Dynamic Method Binding, Multiple Inheritance

Books:

B1. Scott Programming Language Pragmatics, 3 rd edition, ISBN 9788131222560 Kaufmann Publishers, An Imprint of Elsevier, USA

B2. Concepts of Programming Languages, 8 th Edition by Robert W. Sebesta, Pearson Education.

B3. LISP 3rd edition by Patrick Henry Winston & Berthold Klaus Paul Horn (BPB)

B4. Introduction to Turbo Prolog by Carl Townsend

B5. Programming Language Concepts third edition, Ghezzi , wiley publication

Evaluation Scheme:
The duration of the ESE paper will be 3 Hours and 50 marks. There will be 8 questions each of 10 marks and student can solve any 5 out of 8 questions. Final question paper will be of 80 marks (with options) and chapter wise distribution will be as follows:

Sr. No.	Chapter	No of Lect.	Weightage Marks
1	Introduction	02	04
2	Functional Programming Language	05	6
3	Programming language based on Logic (Turbo Prolog)	10	14
4	Names, Scopes, and Bindings	05	10
5	Data Types	08	14
6	Control Flow	05	10
7	Subprograms and Implementing subprograms	07	14
8	Data Abstraction and Object Orientation	06	08
	Total	48	80

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that

- There should not be more than one sub questions on the same unit
- There should not be more than one question containing sub questions on the same pair of units.

CA-503: Data Mining & Warehousing

Pre – Requisites

1. Knowledge of Data base Fundamentals
2. Basic understanding of analysis of algorithms
3. Basic Statistical concepts related to measures of central tendency and dispersion

Objectives

1. To study the structure of Data Warehouse and the ETL process
2. To study different data pre processing techniques.
3. To study basic descriptive and predictive data mining techniques
4. To study some advanced data mining techniques and their applications
5. To use data mining tool on different data sets

Chapter I: Introduction to Data Mining
Definition of Data Mining and Data Warehousing, DM versus Knowledge Discovery in Databases, Data to be mined, basic mining techniques, Data Mining Issues, Data Mining Metrics, Social Implications of Data Mining, Overview of Applications of Data Mining

Chapter II: Data Preprocessing
Data Processing prerequisites, Attributes and Data types, Statistical descriptions of data, Distance and similarity measures, Need for Preprocessing, Handling Missing data , Data Cleaning, Data Integration , Data Reduction, Data Transformation and Data Discretization

Chapter III: Introduction to Data Warehousing
Architecture of DW, OLAP and Data Cubes, Dimensional Data Modeling-star, snowflake schemas, DMQL.

Chapter IV: Association Rule Mining
Market Basket analysis, Frequent item-sets and Association rule mining: Apriori algorithm, FP growth algorithm, sampling Algorithms.

Chapter V: Classification & Prediction
Definition of classification, Model construction, Model Usage, choosing algorithm, Decision tree Induction, Information gain, gain ratio, gini index, Bayesian Classification, Bayes Theorem, Naïve Bayes classifier, Measuring performance of classifiers, Precision, recall, F-measure, confusion matrix, cross-validation, bootstrap, Linear Regression, Non-linear Regression, Logistic Regression

Chapter VI: Clustering
Definitions, Partitioning methods, Hierarchical clustering, Density Based methods

Chapter VII: Data Mining Tool
Weka, Performance measures TP, FP, ROC, baseline algorithms zeroR, oneR

Text Books:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Elsevier Morgan kaumann publishers, ISBN:9789380931913

2. Margaret H. Dunham, S. Sridhar, Data Mining – Introductory and Advanced Topics, Pearson Education

3. Modern Data warehousing and mining and visualization George Marak Pearson publication

Reference Books:

1. Tom Mitchell, —Machine Learning, McGraw-Hill, 1997

2. R.O. Duda, P.E. Hart, D.G. Stork. Pattern Classification. Second edition. John Wiley and Sons, 2000.

3. Christopher M. Bishop, — Pattern Recognition and Machine Learning, Springer 2006

4. Ian H.Witten, Eibe Frank Data Mining: Practical Machine Learning Tools and Techniques, Elsevier/(Morgan Kauffman), ISBN:9789380501864

5. Data warehousing: fundamentals fot IT professionals 3rd edition , Kimball, Wiley Publication

CA-504: Software Project Management

Prerequisites:

- Knowledge of Software Engineering
- Basics of Software Testing

Objectives:

- Project Management covers skills that are required to ensure successful medium and large scale software projects.
- It examines Requirements Elicitation, Project Management, Verification and Validation and Management of Large Software Engineering Projects.
- Student learn to select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management; perform software verification and validation using inspections, design and execution of system test cases.

Syllabus:

UNIT 1: Introduction to Project Management
What is Project?, What is Project Management? Role of Project Manager, Ethics in Project Management.

UNIT 2: Project Management and Information Technology Context
A Systems View of Project Management, The Three-Sphere Model for Systems Management, Stakeholder Management, Project Phases and the Project Life Cycle, The Context of Information Technology Projects

UNIT 3: Project Integration Management
What is Project Integration Management? , Strategic Planning and Project Selection, Developing a Project Charter, Developing a Project Management Plan

UNIT 4: Project Scope Management
What Is Project Scope Management?, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Verifying Scope, Controlling Scope

UNIT 5: Project Time management
The importance of Project Schedule, defining activities, sequencing activities, Estimating Activity Resources, Estimating Activity Durations, Developing the Schedule, Numerical on CPM

UNIT 6: Project Cost Management
The importance of Cost Management, Basic Principles of Cost Management, Estimating Costs, Controlling Costs, Earned Value Management, Numerical on COCOM

UNIT 7: Quality Management
The Importance of Project Quality Management, What Is Project Quality Management? , Planning Quality, Performing Quality Assurance, Performing Quality Control, Modern Quality Management, Deming and his 14 Points for Management

UNIT 8: Human Resource Management
What Is Project Human Resource Management?, The Importance of Human Resource Management, Project Organizational Charts, staff acquisition

UNIT 9: Communication Management
Reporting Performance, Suggestions for Improving Project Communications

UNIT 10: Risk Management
The Importance of Project Risk Management, Planning Risk Management, Common Sources of Risk on Information Technology Projects. Identifying Risks, Performing Qualitative Risk Analysis , Using Probability/Impact Matrixes to Calculate Risk Factors

UNIT 11: Procurement Management
The Importance of Project Procurement Management, Planning Procurements , Tools and Techniques for Planning Procurements, Procurement Management Plan , Statement of Work , Procurement Documents, Source Selection Criteria

Reference Books

1. Information Technology Project Management, 6th Edition Kathy Schwalbe ISBN-13 :9781111221751 , Cenage Learning
2. Software Engineering: A Practioner's Approach by Roger S. Pressman ISBN: 9780071267823
3. Software Project Management Black Book Kogent, Wiley publication
4. Software Project Management : A real world Joel Henry Pearson publication

CA-507: Image Processing

1. Introduction

Definition of Digital Image Processing, Origins of Digital Image Processing, Examples of fields that use Digital Image Processing - X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

2. Digital Image Fundamentals

Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition - Single Sensor, Sensor Strips, Sensor Arrays, A Simple Image Formation Model; Image Sampling and Quantization - Spatial and Gray-Level Resolution, Aliasing, Some Basic Relationships between Pixels -
Neighbors, Adjacency, Connectivity, Regions, and Boundaries, Distance Measures, Image Operations on a Pixel Basis; Linear and Nonlinear Operations

3. Image Enhancement in the Spatial Domain

Some Basic Gray Level Transformations - Negatives, Log, Power-Law, Piecewise-Linear Transformations; Histogram Processing - Histogram Equalization; Enhancement Using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering, Smoothing Spatial Filters – Smoothing Linear and Order-Statistics Filters; Sharpening Spatial Filters - Use of First Derivatives for Enhancement, Use of Second Derivatives for Enhancement : The Laplacian, High Boost Filtering, High Frequency Emphasis Filtering

4. Image Enhancement in the Frequency Domain

Introduction to the Fourier Transform and the Frequency Domain, Two-Dimensional DFT and its Inverse, Some Properties of the 2-D Fourier Transform; Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domains, The Convolution Theorem(Only 2D);
Frequency-Domain Lowpass Filters - Ideal , Butterworth, and Gaussian
Frequency Domain Highpass Filters - Ideal , Butterworth, and Gaussian
Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering

5. Image Restoration

A Model of the Image Degradation/Restoration Process, Noise Models; Restoration in the Presence of Noise Only – Spatial Filtering - Mean, Order-Statistics, and Adaptive Filters;

Periodic Noise Reduction by Frequency Domain Filtering – Band reject, Band pass, and Notch Filters;
Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Geometric Mean
Filter - Geometric Transformations, Spatial Transformations

6. **Morphological Image Processing**

Some Basic Concepts from Set Theory, Logic Operations Involving Binary Images; Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation; Some Basic Morphological Algorithms - Boundary Extraction, Region Filling, Extraction of Connected Components, Thinning, Thickening

7. **Image Segmentation**

Detection of Discontinuities - Point Detection, Line Detection, Edge Detection, Edge Linking and Boundary Detection, Thresholding- The Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Region-Based Segmentation -Region Growing, Region Splitting and Merging

Representation and Description

Chain Codes, Polygonal Approximations, Signatures, Shape Methods (Mathematical Problems)

Text Book:

1. Gonzalez, R. C. and Woods, R. E. [2002/2008], Digital Image Processing, 2nd/3rd edition, Prentice Hall

Reference Books:

1. Sonka, M., Hlavac, V., Boyle, R. [1999]. Image Processing, Analysis and Machine Vision (2nd edition), PWS Publishing, or (3rd edition) Thompson Engineering, 2007

2. Gonzalez, R. C., Woods, R. E., and Eddins, S. L. [2009]. Digital Image Processing Using MATLAB, 2nd ed., Gatesmark Publishing, Knoxville, TN.

3. Anil K. Jain [2001], Fundamentals of digital image processing (2nd Edition), Prentice-Hall, NJ

4. Willian K. Pratt [2001], Digital Image Processing (3rd Edition), John Wiley & Sons, NY

5. Burger, Willhelm and Burge, Mark J. [2008]. Digital Image Processing: An Algorithmic Introduction Using Java, Springer

6. Digital Image Analysis (With CD-ROM), Kropatsch, Springer, ISBN 978038795066

7. Digital Image Processing, 6e (With CD), Jähne, Springer, ISBN:978-3-540-24035-8 2

8. Fundamentals of digital image processing S.Annadurai Pearson education

CS-508: E-Commerce

Objectives -:

1. To know the concept of electronic commerce
2. To Know what is Internet and Extranet
3. To know Internet marketing techniques

Unit No	Topic
1	**INTRODUCTION TO E-COMMERCE** 1.1 Meaning and concept of E-Commerce; 1.2 History of E-Commerce; 1.3 Traditional Commerce and E-Commerce; 1.4 Different types of E-Commerce – B2B, B2C, C2C, B2E, G2C; 1.5 Need and Role of E-Commerce; 1.6 Advantage and Disadvantage of E Commerce
2	**E-COMMERCE TECHNOLOGIES** 2.1 Internet & WWW; 2.2 Internet Protocols – OSI Model, TCP/IP, TCP, UDP, IP, DNS, FTP; 2.3 Multimedia technology – ISDN, ATM, Cell relay, desktop,Video Conferencing; 2.4 Information Publishing Technology - HTML, URL, HTTP, HTML FORM, HTTPD, CGI SERVICES, Web Server and client; 2.5 **Advance Technologies** – Mobile Agents, WAP, XML, web 2.0, REST web services,Web Mashup.
3	**E-COMMERCE STRATEGIES** 3.1 Consumer Oriented – strategies for marketing, sales & promotion, e-CRM, order delivery Cycle; 3.2 Business Oriented - strategies for purchasing & support activities (SCM), Strategies for Web Auction, 3.3 Virtual Communities 3.4 Web Portal.
4	**ELECTRONIC PAYMENT SYSTEM** 4.1 Introduction to payment system; 4.2 Online Payment System – prepaid e-payment service, postpaid e-payment system; 4.3 SET protocol; 4.4 Operational, Credit & legal risk of e payment system.
5	**ELECTRONIC DATA INTERCHANGE** 5.1 Meaning EDI and Paperless trading; 5.2 EDI architecture; 5.3 EDI standards; 5.4 VAN; 5.5 Cost of EDI Infrastructure; 5.6 Internet based EDI; 5.7 FTP- based messaging.
6	**E-COMMERCE INFRASTRUCTURE** 6.1 Cluster of servers; 6.2 Virtualization techniques; 6.3 Cloud Computing; 6.4 Server Consolidation using cloud; 6.5 Introduction to Hadoop, HDFS, Google Apps Engine.

7	**SECURITY & LEGAL ISSUES** 7.1 Computer security classification; 7.2 E-Commerce threats; 7.3 Security of Clients and sever; 7.4 Cyber law introduction; 7.5 Copyright and intellectual Property concept relating to ecommerce.

References :

1. Bharat Bhasker, Electronic Commerce – Frame work technologies and Applications, 3rd Edition. Tata McGrawHill Publications, 2008.
2. Kamlesh K.Bajaj and Debjani Nag, Ecommerce- the cutting edge of Business, Tata McGrawHill Publications, 2008
3. Kalakota et al, Frontiers of Electronic Commerce, Addison Wesley, 2004
4. E- Commerce Strategies, Technology and applications (David) Tata McGrawHill
5. Introduction to E-commerce (jeffrey) Tata- Mcgrawhill
6. E-Business and Commerce- Strategic Thinking and Practice (Brahm) biztantra
7. Google Aps engine (Severance) O'reilly
8. Hadoop : The Definitive Guide (White) O'reilly

CA-509: Mobile Computing

Prerequisite
Knowledge of TCP/IP protocol suite and Java Programming is essential.

Objectives
- To create awareness about mobile computing technology
- To create awareness about new programming platforms for mobile and wireless technologies
- To make our students capable for the current and emerging new trends in IT from software development point of view.

1. **Introduction to Mobile Computing**
   - 1.1. Reference Model **(Book 1, Chapter 1)**
   - 1.2. Spread Spectrum **(Book 1, Chapter 2)**
   - 1.3. Cellular Systems **(Book 1, Chapter 2)**
   - 1.4. Mobile Computing **(Book 2, Chapter 1)**
     - 1.4.1. Mobile Computing Functions
     - 1.4.2. Mobile Computing Devices
     - 1.4.3. Dialogue Control
     - 1.4.4. Networks - Wireline Networks, Wireless Networks, Ad hoc Networks
     - 1.4.5. Bearers
   - 1.5. Middleware and Gateways **(Book 2, Chapter 1)**
   - 1.6. Application and Services **(Book 2, Chapter 1)**
   - 1.7. Developing Mobile Computing Applications **(Book 2, Chapter 1)**

2. **Mobile Computing Architecture (Book2, Chapter2)**
   - 2.1. Three-tier Architecture-Presentation, Message-oriented Middleware(MOM), Transaction-Processing (TP) Middleware, Data,
   - 2.2. Design Considerations for Mobile Computing
   - 2.3. Client Context Manager
   - 2.4. Context Aware Systems

3. **Emerging Technologies (Book 2, Chapter 4)**
   - 3.1. Bluetooth – protocol stack, security, Application Model
   - 3.2. Radio Frequency Identification (RFID) and its Applications
   - 3.3. Wireless Broadband (WiMAX)

4. **Telecommunication Systems (Book 2, Chapter 5, 6, 7)**
   - 4.1. GSM – Mobile Services, System Architecture, localization and calling, Handover, Security
   - 4.2. Short Messaging Service (SMS) – Strength of SMS, SMS Architecture, Short Message Mobile Terminated (SM MT), Sort Message Mobile Originated (SM MO), SMS as Information Bearer, Operator Centric – Pull, Operator-independent Push, Challenge for

SMS as a Mobile Computing Bearer, Operator – independent Pull, Value Added Services through SMS, Alert Services, Location-based software,

4.3. GPRS – Architecture, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Billing and Charging in GPRS

5. **Mobile Network Layer (Book 1, Chapter 8)**
   - 5.1. Mobile IP
     - 5.1.1. Goals, Assumptions and Requirements
     - 5.1.2. Entities and Terminologies
     - 5.1.3. IP Packet Delivery
     - 5.1.4. Agent Discovery
     - 5.1.5. Registration
     - 5.1.6. Tunnelling and encapsulation
     - 5.1.7. Optimizations
     - 5.1.8. Reverse Tunneling
     - 5.1.9. IPV6 for mobile IP
     - 5.1.10. IP-Micromobility support
   - 5.2. Mobile Ad-hoc Networking
     - 5.2.1. Routing
     - 5.2.2. Destination Sequence Distance Vector (DSDV)
     - 5.2.3. Dynamic Source Routing (DSR)
     - 5.2.4. Alternative Metrics
     - 5.2.5. Flat ad-hoc routing
     - 5.2.6. Hierarchical ad-hoc routing
     - 5.2.7. Geographic-position-assisted routing

6. **Mobile Transport Layer - TCP Improvements (Book 1, Chapter 9)**
   - 6.1. Indirect TCP
   - 6.2. Snooping TCP
   - 6.3. Mobile TCP
   - 6.4. Fast Retransmit/Recovery
   - 6.5. Transmission/time-out freezing
   - 6.6. Selective retransmission
   - 6.7. Transaction – oriented TCP
   - 6.8. TCP over 2.5/3G wireless networks

7. **Wireless Application Protocol (WAP)(Book 2, Chapter 8)**
   - 7.1. WAP Application Environment (WAE) – User Agent, User Agent Profile (UAProf), Wireless Markup Language (WML), WML Script, Wireless Telephony Application (WTA)
   - 7.2. WAP Push Architecture
   - 7.3. Wireless Session Protocol(WSP)

7.4. Wireless Transaction Protocol (WTP)
7.5. Wireless Transport Layer Security (WTLS)
7.6. Wireless Data Protocol (WDP)
7.7. WAP Gateway
7.8. MMS – Architecture, Transaction Flows, SMIL (Synchronized Multimedia Integrated Language), Interaction, Interoperability and Roaming, Device Management and Configuration, Digital Rights Management, OMA Digital Rights Management

8. **Client Programming(Book2, Chapter 12)**
   8.1. Hardware Overview,
   8.2. Mobile Phones and Features of Mobile Phones
   8.3. PDA
   8.4. Design Constraints in Application for Handheld Devices
   8.5. Recent Development in Client Technologies

9. **Android Application Development (Only for LAB Work as an Internal Assessment)**
   9.1. Setting up Android Development Environment
   9.2. Defining Application Using the Android Manifest File
   9.3. Managing Application Resources
   9.4. Designing User Interfaces With Layout
   9.5. Working with Fragments, Dialogs, Preferences, Files and Directories
   9.6. Android Software Development Process
   9.7. Designing and Developing Android Applications
   9.8. Testing and Publishing Android Applications

Teachers can create practical handbook on Android application Development using Book 3 or Book 3 itself can be used as a practical handbook for Android Programming.

Internal Assessment:

Students should be encouraged to do following activities as a part of continuous assessment.

- Programming Assignments
- Mini Project
- Case studies
- Seminars
- Survey Report / Informative Research Reports

External Examination:

- Frame and packet formats should not be asked.
- No questions on Android programming should be asked.

Reference Books:

Book 1: Mobile Communications by Jochen Schiller, Pearson
Book2: Mobile Computing Technology, Applications and Service Creation by Asoke K. Talukder, Hasan Ahmed, Roopa R Yevgal, McGraw Hill Education, Second Edition
Book3: Android Wireless Application Development Volume I: Android Essentials by Lauren Darcey, Shane Conder, Pearson
Book4: Hello, Android – Introducing Google's Mobile Development Platform, Ed Burnette, SPD
Book5:Principles of mobile computing second edition by hansmall wiley publication
Book6:Mobile computing principles by reza B'far by Cambridge publication

CA-602: Software Testing & Quality Assurance

Chapter 1: Software Testing and Introduction to quality

Introduction, Nature of errors, an example for Testing, Definition of Quality , QA, QC, QM and SQA , Software Development Life Cycle , Software Quality Factors

Chapter 2: Verification and Validation

Definition of V &V , Different types of V & V Mechanisms, Concepts of Software Reviews, Inspection and Walkthrough

Chapter 3: Software Testing Methods

Testing Fundamentals, Test Case Design, White Box Testing and its types, Black Box Testing and its types

Chapter 4: Software Testing Strategies

Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing

Chapter 5: Software Metrics

Concept and Developing Metrics, Different types of Metrics, complexity metrics

Chapter 6: Defect Management 4

Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement

Chapter 7: Quality Improvement

Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter Diagrams, Run charts,

Chapter 8: Software Quality Assurance

Concepts, Quality Movement, Background issues and SQA activities Software Reviews, Formal Technical Reviews, Formal approaches to SQA Statistical Quality Assurance, Software Reliability, SQA Plan, The ISO 9001 Quality Standard, Six sigma, **Informal Reviews**

Chapter 9: Quality Costs

Quality Cost Measurement, Utilizing Quality Costs for Decision-Making

Chapter 10: 9.Testing Tools (Introduction and execution only)

Junit, Apache Jmeter, Winrunner, Loadrunner, Rational Robot

Reference Books :

1) Software Engineering – A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill
2) Software Engineering for Students- A Programming Approach, Douglas Bell, Pearson Education
3) Quality Management, 5th ed., Prentice-Hall, 2010. Donna C. S. Summers
4) Total Quality Management, Prentice Hall, 2003. Dale H. Besterfield
5) Software engineering: An Engineering approach, John Wiley. J.F.Peters, W.Pedrycz
6) Software testing by yogesh singh Cambridge publication
7) Software Testing and Quality Assurance Theory and Practice by KshirsagarNaik, PriyadarshiTripathy

Insertions:

Reference Books :

6) Software Testing and Quality Assurance Theory and Practice by KshirsagarNaik, PriyadarshiTripathy

CA-603: Embedded Systems

Chapter No.	Topic
1	**Embedded Systems overview** An embedded system, features of embedded system, components of embedded system,examples of embedded system application. Review of Microprocessor family, 8-bit Micro-controllers (Atmel), Architecture(Harvard and Van-Neuman Architecture), Instruction set, Memory organization, Design of target board, Interfacing techniques, Timers, Interrupts I/o pins, Timers, interrupts, serial interface. Processors in embedded systems (RISC, CISC)
2	**Real time system concepts** Foreground/ background systems, Critical section of code, Resourse, shared resourse,Multitasking, task, task switch, Kernel, scheduler, non-preemptive kernel, preemptive kernel, Reentrancy, round-robin scheduling, Task priority, static priority, dynamic priority, priority inversions, assigning task priorities, Mutual exclusion, deadlock, synchronization, event flags, intertask communication, Interrupts : latency, response, recovery, ISR processing time, NMI
3	**Modular programming concepts** Software design cycle, Parameter passing, Recursion,Dynamic allocation, Operating system fundamentals, multi user multi tasking OS, Tasks, Processes and Threads, Scheduling, communication and synchronization
4	**Writing software for embedded systems** The compilation process : compile, link, load, Cross compilers, Run-time-libraries : processor dependent, I/O dependent, system calls, exit routines, Writing a library, using alternative libraries, Porting Kernels C extensions for embedded systems
5	**Development environment and debugging tools** Assemblers, Compilers, Linkers, Loaders, Debuggers, Profilers & Test Coverage Tools, IDE's, Emulators, Logic Analyzer

Reference Books :

1 Kenneth J. Ayala The 8051 Microcontroller, Architecture, Programming And Application [Second Edition] Penram International, (1999).
2 M.A. Mazidi, J. G. Mazidi, R.D. Mckinlay The 8051 Microcontroller And Embedded Systems, Using Assembly and C ,Second Edition (2009) Pearson Education
3. The 8051 Microcontroller Architecture, Programming and Applications K.J. Ayala, Penram Int. Pub.
4. Embedded system design F. Vahid,T. Gargivis John Wiley and Sons
5. Embedded system designAn Introduction to processes tools and Technilques A.S. Berger, CMP Books
6. Computers as Components: Principles of Embedded Computer Systems Design Wayne Wolf Morgan Kaufmann

CA-604: Information Security And Audit

Objectives :-

- Understand some of the basic theory underlying computer security.
- Learn how access to systems, resources, and data can be controlled. Assess the design, placement, and quality of controls.
- Understand the basic issues in auditing computer security policies and mechanisms.

1. Introduction to concept of Information Security

1.1. Computer Security Concepts
1.2. Threats, Attacks, and Assets
1.3. Security Functional Requirements
1.4. A Security Architecture for Open Systems
1.5. Computer Security Trends
1.6. Computer Security Strategy

2. Cryptographic Tools

2.1 Confidentiality with Symmetric Encryption
2.2 Message Authentication and Hash Functions
2.3 Public-Key Encryption
2.4 Digital Signatures and Key Management
2.5 Random and Pseudorandom Numbers
2.6 Practical Application: Encryption of Stored Data

3. User Authentication

3.1 Electronic User Authentication Principles
3.2 Password-Based Authentication
3.3 Token-Based Authentication
3.4 Biometric Authentication
3.5 Remote User Authentication
3.6 Security Issues for User Authentication
3.7 Practical Application: An Iris Biometric System
3.8 Case Study: Security Problems for ATM Systems

4. Access Control

4.1 Access Control Principles
4.2 Subjects, Objects, and Access Rights
4.3 Discretionary Access Control
4.4 Example: UNIX File Access Control
4.5 Role-Based Access Control
4.6 Attribute-Based Access Control
4.7 Identity, Credential, and Access Management

5. Database Security

5.1 The Need for Database Security
5.2 Database Management Systems

5.3 Relational Databases
5.4 SQL Injection Attacks
5.5 Database Access Control
5.6 Inference
5.7 Database Encryption

6. Malicious Software

6.1 Types of Malicious Software
6.2 Advanced Persistent Threat
6.2 Propagation – Infected Content - Viruses
6.3 Propagation – Vulnerability Exploit - Worms
6.4 Propagation – Social Engineering – SPAM E-Mail, Trojans
6.5 Payload – System Corruption
6.6 Payload – Attack Agent – Zombie, Bots
6.7 Payload – Information Theft – Keyloggers, Phishing, Spyware
6.8 Payload – Stealthing – Backdoors, Rootkits
6.9 Countermeasures

7. Denial-of-Service Attacks

7.1 Denial-of-Service Attacks
7.2 Flooding Attacks
7.3 Distributed Denial-of-Service Attacks
7.4 Application-Based Bandwidth Attacks
7.5 Reflector and Amplifier Attacks
7.6 Defenses Against Denial-of-Service Attacks

8. Firewalls and Intrusion Detection and Prevention Systems

8.1 The Need for Firewalls
8.2 Firewall Characteristics and Access Policy
8.3 Types of Firewalls
8.4 Firewall Basing
8.5 Firewall Location and Configurations
8.6 Intrusion Detection
8.1 Intruders
8.2 Intrusion Detection
8.3 Analysis Approaches
8.4 Host-Based Intrusion Detection
8.5 Network-Based Intrusion Detection
8.6 Distributed or Hybrid Intrusion Detection
8.7 Intrusion Detection Exchange Format
8.8 Honeypots
8.9 Intrusion Prevention Systems

9. Software Security

9.1 Software Security Issues
9.2 Handling Program Input

9.3 Writing Safe Program Code
9.4 Interacting with the Operating System and Other Programs
9.5 Handling Program Input

10. Operating System Security

10.1 Introduction to Operating System Security
10.3 System Security Planning
10.3 Operating Systems Hardening
10.4 Application Security
10.5 Security Maintenance

11. Security Auditing

11.1 Security Auditing Architecture
11.2 The Security Audit Trail
11.3 Implementing the Logging Function
11.4 Audit Trail Analysis
11.5 Example: An Integrated Approach

12. Legal and Ethical Aspects

12.1 Cybercrime and Computer Crime
12.2 Intellectual Property
12.3 Privacy
12.4 Ethical Issues

Text Books:

1) Computer Security: Principles and Practice, 3/E, By William Stallings, Lawrie Brown, Pearson Education
2) Information Security: Principles and Practice, 2nd Edition, M. Stamp, Wiley Publication
3) Computer Security: Art and Science By M. Bishop, Pearson Education

CA-605 : Cloud Computing

Objectives:

1. Understanding the concept various service and deployment models cloud computing.
2. Discuss the concept of virtualization and data in cloud.
3. Introduce various security issues in cloud.
4. Providing exposures to some existing cloud platforms and architectures.

Unit I. Introduction to cloud computing

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.

Unit II. Virtualization

Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.

Unit III. Data in cloud computing

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce.

Unit IV. Cloud security

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

Unit V. Issues in cloud computing

Implementing real time application over cloud platform, Issues in Inter-cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud.

Reference Books:

1. Enterprise Cloud Computing by Gautam Shroff,Cambridge publication
2. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
3. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication
4. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
5. Borko Furht, "Handbook of Cloud Computing", Springer
6. Venkata Josyula,"Cloud computing – Automated virtualized data center", CISCO Press
7. Greg Schulr,"Cloud and virtual data storage networking",CRC Press
8. Mark Carlson,"Cloud data management and storage", Mc Graw hill

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