UNIVERSITY OF CALICUT
(Abstract)

Faculty of Engineering – Regulation, Scheme and Syllabus of MCA – implemented – with effect from 2010 admission - Orders issued.

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GENERAL AND ACADEMIC BRANCH – IV 'E' SECTION

GAIV/E1/AC/3.7.2010 Calicut University. P.O., Dated: 02-09-2010.

Read: 1. Minutes of the meeting of the Board of Studies in Engineering (PG) held on 10-12-2009.
2. Minutes of the meeting of the Board of Studies in Engineering (PG) held on 28-01-2010.
3. Minutes of the meeting of the faculty of Engineering held on 28-01-2010.
4. Minutes of the meeting of the Academic Council held on 03-07-2010.

O R D E R

As per paper read 1st, the Board discussed and approved the syllabus of MCA Course.

As per paper read 2nd, the Board of Studies in Engineering in its meeting held on 28-01-2010 discussed and finalized the regulation and scheme of MCA course, to be implemented with effect from 2010 admission.

As per paper read 3rd, the meeting of faculty of Engineering at its meeting held on 28-01-2010, approved the decision of the Board of Studies for approving the regulations and scheme and syllabus of MCA and implementing the same from 2010 admission.

As per paper read 4th, the meeting of Academic Council held on 03-07-2010 approved the decisions of Board of Studies held on 10-12-2009 and 28-01-2010 and the minutes of the faculty of Engineering held on 28-01-2010 for implementing the regulations, scheme and syllabus of MCA Course with effect from 2010-2011 admission.

Sanction has therefore been accorded for implementing the appended regulations, scheme and syllabi of the MCA Course with effect from 2010 admission.

Orders are issued accordingly.

Sd/-
REGISTRAR

To

The Principals of all affiliated Engineering Colleges where MCA Courses are offered.

Copy to:

PS to VC /PA to Reg./PA to CE/
DR;AR-B.Tech Br/Pro/GA-I 'A' Sn/SF/FC

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Sd/-
SECTION OFFICER.

/home/guest/tmp/MCA Syllabus.doc

UNIVERSITY OF CALICUT, THENHIPPALAM

Curriculum for Master of Computer Applications (MCA)

(From 2010 Admissions)

Semester 1

	Code	Title	L	T	P	C
1	MCA10 101	Discrete Structures	3	1		3
2	MCA10 102	Probability and Statistics	3	1		3
3	MCA10 103	Computer Programming	3	1		3
4	MCA10 104	Logic Design	3	1		4
5	MCA10 105	Principles of Software Engineering	3	1		3
6	MCA10 106(P)	Software Lab I			6	3
		Total Credits				19

4 Hours compulsory Library Reference work

Semester 2

	Code	Title	L	T	P	C
1	MCA10 201	Graph Theory and Combinatorics	3	1		3
2	MCA10 202	Computer Organization	3	1		4
3	MCA10 203	Database Management Systems	3	1		3
4	MCA10 204	Operating Systems	3	1		3
5	MCA10 205	Data Structures	3	1		3
6	MCA10 206(P)	Software Lab II (data Structures)			6	3
		Total credits				19

4 Hours compulsory Library Reference work

Semester 3

	Code	Title	L	T	P	C
1	MCA10 301	Numerical analysis and Optimization Techniques	3	1		3
2	MCA10 302	Computer Networks	3	1		3
3	MCA10 303	Principles of Compiler Design	3	1		3
4	MCA10 304	Core Java	3	1		4
5	MCA10 305	Principles of Accounting and Financial Management	3	1		3
6	MCA10 306(P)	Software Lab III (DBMS Lab)			6	3
		Total credits				19

4 Hours compulsory Library Reference work

Semester 4

	Code	Title	L	T	P	C
1	MCA10 401	Cryptography and Network Security	3	1		3
2	MCA10 402	Software Architecture and Project Management	3	1		4
3	MCA10 403	Web Programming	3	1		3
4	MCA10 404	Elective -1	3	1		3
5	MCA10 405	Elective-2	3	1		3
6	MCA10 406(P)	Mini -Project			6	3
		Total credits				19

4 Hours compulsory Library Reference work

Semester 5

	Code	Title	L	T	P	C
1	MCA10 501	Object oriented modeling and Design	3	1		3
2	MCA10 502	Computer Graphics and Multimedia Systems	3	1		4
3	MCA10 503	Wireless Communication	3	1		3
4	MCA10 504	Elective-3	3	1		3
5	MCA10 505	Elective-4	3	1		3
6	MCA10 506(P)	Seminar			6	3
		Total credits				19

4 Hours compulsory Library Reference work

Semester 6

	Code	Title	L	T	P	C
1	MCA10 601	Project	-	-	30	15
		Total credits				15

ELECTIVE SUBJECTS

Elective I

MCA10 404 A Artificial Intelligence.

MCA10 404 B Image Processing

MCA10 404 C Advanced DBMS

Elective 2

MCA10 405 A Designs and Analysis of Algorithms

MCA10 405 B Simulation and Modeling

MCA10 405 C Embedded Systems

Elective 3

MCA10 504 A Electronic Commerce

MCA10 504 B Computer Architecture

MCA10 504 C Soft computing Techniques

Elective 4

MCA10 505 A Data Mining and Data ware housing

MCA10 505 B Pattern Recognition and Classification

MCA10 505 C Distributed Computing

SEMESTER -1

MCA10 101 DISCRETE STRUCTURES

Objectives

- The course is indented to provide a good foundation in the fundamentals of certain discrete structures that are required in a deeper understanding of the theory and applications of computer science. The course covers basic symbolic logic, set theory including the theory of relations and functions, and elementary concepts of groups, rings and fields.

Module 1 (10 hrs)

Logic : Logical connectives and truth tables – Logical equivalence and laws of logic – Logical implication and rules of inference- Quantifier

Module II (10 hrs)
Sets and subsets - Set operations and their properties - Relations – Relation matrices – Properties of relations - Equivalence relations and partitions – Composition of relations

Module III (10 hrs)
Functions – One-to-one, onto functions – Composition of functions and inverse functions- Partial orders- Hasse diagrams.

Module IV (10 hrs)
Group theory - Definition and elementary properties- Cyclic groups- Homomorphism and isomorphism - Subgroups- Cosets and Lagrange's theorem

Module V (10 hrs)
Rings and Fields - Definitions and examples of rings, integral domains and fields- Elementary properties and substructures - Homomorphism and isomorphism – The ring Zn

Text books
1. Tremblay, J P & Manohar,R, *Discrete and Mathematical Structures with Applications to Computer Science,* Tata McGraw Hill Book Company.

2. Ralph P Grimaldi, *Discrete and Computational Mathematics*: *An applied introduction* (5th Edition), Pearson Education, 2007.

Reference books

1. Kolman B & Busby R C, *Discrete and Mathematical Structures for Computer Science,* Prentice Hall of India.

2. Kenneth H Rosen, *Discrete Mathematics and its Applications with Combinatorics and Graph Theory* (6th Edition), Tata McGraw Hill Education Private Limited.

3. Garding, L & Tambour T, *Algebra for Computer Science*, Narosa Publishing House, New Delhi.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30

Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 102 PROBABILITY AND STATISTICS

objectives

- *This course is objected to inculcate the students an adequate understanding of the basic concepts of probability theory and statistics to make them develop an interest in the area which may find useful to pursue their studies.*

MODULE 1: (12 Hrs)

Probability distributions:- Random variables, Binomial distribution, Hyper geometric distribution; Mean and variance of probability distribution, Chebysheve's theorem, Poisson approximation to the Binomial, Poisson processes, Geometric distribution, Normal distribution, Normal approximation to Binomial distribution, Uniform distribution, Log-Normal Distribution, Gamma distribution, Beta distribution, Weibull distribution.

MODULE 2: (10 Hrs)

Sampling Distributions and Inference concerning Means:- Population and Samples, The Sampling distribution of the mean (Sigma known and Sigma unknown), Sampling distribution of variance, Point estimation, Bayesian estimation, Tests of Hypotheses, The null hypotheses and the significance tests, Hypotheses concerning one mean, Operating characteristic curves, Inference concerning two means.

MODULE 3: (10 Hrs)

Inference concerning Variances and Proportions:- Estimation of variances, Hypotheses concerning one variance, Hypothesis concerning two variances, Estimation of proportions, Bayesian estimation, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Analysis of r x c tables, Goodness of fit

MODULE 4: (10 Hrs)

Correlation and regression analysis: Curve fitting, the method of least squares, inference based on the least square estimators, curvilinear regression, correlation, Fisher's transformation, inference concerning correlation coefficient.

MODULE 5: (10 Hrs)

Analysis of Variance:- General principles, Completely randomized designs, Randomized Block diagram, Multiple comparisons, Some further experimental designs, Analysis of co variance.

Text Books

1. Johnson R A, Miller and Freund’s Probability for Engineers

Reference Books

1. Levin R I & Rubin DS, Statistics for Management, PHI
2. J S Milton, Jose C Arnold, Probabilities in engineering and Computing Science, McGraw Hill
3. S M Rose, Introduction to Probability and Statistics for Engineers and Scientists, John Wiley
4. Harry Frank and Steven C, Statistics concepts and application, Cambridge University Press

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 103 COMPUTER PROGRAMMING

Objectives.

- To impart knowledge about the software development.
- To develop a software by using programming languages.
- To give the concept of object oriented programming.

Module 1(10 Hrs)

Programming and problem solving - Computer organization - High level and low level.1anguages - Steps involved in computer programming - Developing algorithms and flow charts - Efficiency of algorithms - Running, debugging and testing of programs - Program design methods - Top-down modular programming - Measures of program performance.

Module 2(12 Hrs)

Programming concepts: algorithms and flow charts - Introduction to C: identifiers, keywords, constants, variables and data types, access modifiers, data type conversions- operators- conditional controls - loop controls - arrays - I/O operations. Function prototyping - function arguments - actual vs. formal parameters -recursion- pointers, pointer variables, pointer concepts in functions - multiple indirections.

Module 3(10 Hrs)

Pointers and arrays - arrays as Inaction arguments - functions returning addresses - dynamic memory allocation - storage class

Module 4(10 Hrs)

Structures - union - typedef- enum -array of structures - pointers to structures -macros and preprocessor. Character I/O - string I/O - formatting I/O - file I/O - error handling during I/O -

command line arguments - Low level programming: register variables, bitwise operations, bit fields.

Module 5(10 Hrs)

Introduction to object oriented programming - Principles of OOP - Object oriented programming paradigm - Basic concepts of OOP Classes and abstract data types - Overloading - Constructors and destructors - Inheritance - Polymorphism - Templates Benefits of OOP - Object-oriented languages - Applications of OOP.

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Text Book

1. Schneider G M, Weigngart S W & Perlman; An Introduction to Programming and Problem Solving with Pascal, John Wiley (Module I)

2. W. Kernighan and D.M. Ritchie, The C Programming Language, PHI 2002

3.Balaguruswamy E, Object Oriented Programming with C++, McGraw Hill

Reference books:

1.B.S. Gottfried, Programming with C TMH 2001

2. Herbert Schilbt, C++ - the complete reference, TMH 2002

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 04 LOGIC DESIGN

Objectives

- *To introduce the principles, features and properties of digital devices and circuits. This provides the basic concepts of computations and logic designs of Arithmetic Logic Unit (ALU) of a Computer.*
- *To familiarize the student with the internals of a microprocessor with a wide range of processing capabilities.*
- *Also to give a fair idea of various interfacing methods and devices, along with a detailed treatment of important design issues.*

Module I: (8 Hrs)

Number Systems and codes - 1's and 2's Complement Representation of Signed Numbers - Binary Arithmetic - Logic gates – Universal property of NAND and NOR gates - Boolean Algebra - Simplification using Boolean Algebra - Standard forms of Boolean Expressions – Sum of Products and Product of Sums - Karnaugh Maps.

Module II: (8 Hrs)

Analysis and design of Combinational logic circuits - Adders - Decoders and Encoders - Code converters - Multiplexers and Demultiplexers. Sequential Logic circuits: Flipflops - Synchronous and Ripple Counters - Gray code counters – Shift Registers.

Module III: (13 Hrs)

Historical Background of microprocessors - Architecture of **8088** and **8086** - Addressing modes - Instruction set - Assembly Language Programming with MASM.

Module IV: (15 Hrs)

The Memory and I/O Interfaces of **8086** and **8088** Microprocessors - Memory Devices - I/O interface circuits and LSI peripheral devices - 8255 PPI - 8254 PIT - 8237 DMA controller - 8250 UART – 8279 Keyboard and display controller.

Module V: (8 Hrs)

Hardware and Software Interrupts of **8086** and **8088** - 8259 PIC. Introduction to **8051** 8-bit Micro controller.

Text Books:

1. **Digital Fundamentals** - T.L.Floyd and R.P.Jain (Modules I and II)
2. **The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and**

   Applications, Walter A Triebel and Avtar Singh (Modules III, IV and V)

3. **The 8051 Micro Controller and Embedded Systems**

   Muhammed Ali Mazidi and Janice G Mazidi (Module V)

Reference Texts:

1. **Microprocessor and Interfacing: Programming and Hardware.** - D.V Hall
2. **Microcomputer Systems: The 8086/8088 Family, Architecture, Programming, and Design** - Yu-Cheng Liu and Glenn A. Gibson, Prentice Hall, Inc.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 105 PRINCIPLES OF SOFTWARE ENGINEERING

objectives

- To give an overview of the development of methodologies and steps to be followed for development of quality software.

Module I: (12 hrs)

Introduction – FAQs about software engineering – professional and ethical responsibility – system modeling – system engineering process – the software process – life cycle models – iteration – specification – design and implementation – validation – evolution – automated process support – software requirements – functional and non-functional requirements – user requirements – system requirements – SRS – requirements engineering processes - feasibility studies – elicitation and analysis – validation – management.

Module II: (10 hrs)

System models – context models – behavior models – data models – objects models – CASE workbenches – software prototyping – prototyping in the software process – rapid prototyping techniques – formal specification – formal specification in the software process – interface specification – behavior specification – architectural design – system structuring – control models – modular decomposition – domain specific architectures

Module III: (9 hrs)

Object-oriented design – objects and classes – an object oriented design process case study – design evolution - design with reuse – component based development – application families – user interface design – design principles – user interaction – information presentation – user support – interface evaluation.

Module IV(8 hrs)

Software testing – defect testing – integration testing – object-oriented testing – testing workbenches – software change – software maintenance – architectural evolution – software re-engineering – data re-engineering.

Module V: (13 hrs)

Software project management – project planning – scheduling – risk management – managing people – group working – choosing and keeping people – the people capability maturity model – software cost estimation – productivity estimation techniques – algorithmic cost modeling – project duration and staffing quality management – quality assurance and standards – quality planning – quality control – software measurement and metrics – process improvement – process and product quality – process analysis and modeling – process measurement – process CMM

Text Book

1. Ian Somerville, Software Engineering, Pearson Education Asia.

Reference books

1. Pressman R.S, Software Engineering, McGraw Hill
2. Jalote P, An Integrated Approach to Software Engineering, Narosa
3. Mall R, Fundamentals of Software Engineering, Prentice Hall India

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 106(P) SOFTWARE LAB – 1

Objectives

- *To give a strong foundation for developing the art of programming to the students of computing streams. For adequacy this has to be complemented by exercises appearing in the references.*

SET I (3 Lab Sessions)

HCF (Euclid's algorithm) and LCM of given numbers - find mean, median and mode of a given set of numbers – Conversion of numbers from binary to decimal, hexadecimal, octal and back – evaluation of functions like ex, sinx, cosx etc. for a given numerical precision using Taylor's series – testing whether a given number is prime.

SET II (2 Lab Sessions)

String manipulation programs: sub-string search, deletion – lexicographic sorting of a given set of strings – generation of all permutations of the letters of a given string using recursion..

SET III (2 Lab Sessions)

Matrix operations: Programs to find the product of two matrices – inverse and determinant (using recursion) of a given matrix.

SET IV (3 Lab Sessions)

Files: Use of files for storing records with provision for insertion, deletion, search, sort and update of a record.

References

1. H. Schildt, C: The Complete Reference, 4/e, Tata McGraw Hill, 2000.
2. H. H. Tan and T. B. D'Orazio, C Programming for Engineering & Computer Science, McGraw Hill, 1999.
3. T. H. Cormen, C. E. Lieserson, R. L. Rivest, Introduction to Algorithms, PHI, 1998.
4. Balaguruswamy E, Object Oriented Programming with C++, McGraw Hill
5. Bruce Eckel, Thinking in C++, 2/ed. Vol I and II, Prentice Ball India (Available online at www.bruceeckel.com)
6. Herbert Schilbt, C++ - the complete reference, TMH 2002

Sessional work assessment	
Lab practical and record	= 30
Tests	= 20
Total	= 50

SEMESTER 2

MCA10 201 GRAPH THEORY AND COMBINATORICS

Module I: (12 hrs)

Introduction to graphs, definitions, sub graphs, paths and cycles, matrix representation of graphs, Euler tours, Chinese Postman problem, Planar graphs, Euler's formula, platonic bodies, applications of Kuratowski's theorem, Hamiltonian graphs, graph coloring and chromatic polynomials, map coloring.

Module II: (8 hrs)

Trees, definitions and properties, rooted trees, trees and sorting, weighted trees and prefix codes, bi connected components and articulation points, Kruskal's and Prim's algorithms for minimal spanning trees.

Module III (7 Hrs)

Dijakstra’s shortest path algorithm - bellman ford algorithm – all pair shortest path – Floyed-Warshall algorithm- the max flow min cut theorem - maximum bipartite matching

Module IV: (11 hrs)

Fundamental principles of counting, permutations and combinations, binomial theorem, combinations with repetition, Combinatorial numbers, Principle of inclusion and exclusion, derangements, arrangements with forbidden positions.

Module V: (14 hrs)

Generating functions, partitions of integers, the exponential generating function, the summation operator, Recurrence relations, first order and second order, non homogeneous recurrence relations, method of generating functions

Text Book

1. Grimaldi R P, Discrete Combinatorial Mathematics: An Applied Introduction, Addison Wesley

Reference Books

1. Clark J & Holton D A, A first look at Graph Theory, Allied Publishers (World Scientific)
2. Liu C L, Elements of Discrete Mathematics, McGraw Hill
3. Mott J L, Kandel A & Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall India
4. Cormen T.H., Leiserson C.E, Rivest R.L. and Stein C, Introduction to Algorithms, MIT Press,
5. Rosen K H, Discrete Mathematics and Its Applications, McGraw Hill

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 202 COMPUTER ORGANIZATION

Objectives

- *To lay the foundation for the study of hardware organization of digital computers. It brings out the interplay between various building blocks of computers, without being specific to any particular computer. At the end of the course, the student is expected to gain a fair idea about the functional aspects of each building block in computer design, in the general sense.*

Module I: (14 hrs)

Computer abstraction and technology: below your program, under the covers, historical perspective. Measuring performance: relating the metrics, evaluating, comparing and summarizing performance, Case study: SPEC95 benchmark. Instructions: operations and operands of the computer hardware, representing instructions, making decision, supporting procedures, beyond numbers, other styles of addressing, starting a program, Case study: 80x86 instructions.

Module II: (12 hrs)

Computer arithmetic: signed and unsigned numbers, addition and subtraction, logical operations, constructing an ALU, multiplication and division, floating point, Case study: floating point in 80x86.

Module III: (7 hrs)

The processor: building a data path, simple and multicycle implementations, microprogramming- exceptions, Case study: Pentium Pro implementation

IV: (11 hrs) Module

Memory hierarchy: caches, cache performance, virtual memory, common framework for memory hierarchies, Case study: Pentium Pro memory hierarchy.

Module V: (14 hrs)

Input/output: I/O performance measures, types and characteristics of I/O devices, buses, interfaces in I/O devices, design of an I/O system.

Text Book

1. Pattersen D.A. & Hennesy J.L., *Computer Organisation & Design: The Hardware/Software Interface*, Harcourt Asia.

Reference Books

1. Heuring V.P. & Jordan H.F., *Computer System Design & Architecture*, Addison Wesley
2. Hamacher, Vranesic & Zaky, *Computer Organisation*, McGraw Hill

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 203 DATABASE MANAGEMENT SYSTEMS

Objectives

- *To introduce the basic concepts of data bases connected with software engineering techniques and background information useful for the management of data bases. The syllabus includes the file organization, database design and transaction processing techniques.*

Module I(12hrs)

Introduction – characteristics of database approach – advantages of using DBMS – database concept and architecture – data models – schemes – instances – data independence – database languages and interfaces – database modeling using entity-relationship(ER) – entity set attributes and keys – relationships – type role and structural constraints – weak entity types – enhanced entity-relationship(EER) and object modeling – sub classes – super classes and inheritance – specialization and generalization – modeling of union types.

Module I (10hrs)

File organization and storage – secondary storage devices – RAID technology – operations in file – heap files and sorted files – hashing techniques – type of single level ordered index, multi-level indexes – B-trees and B+trees – indexes on multiple keys – other types of indexes.

Module III(14hrs)

Database design – functional dependencies – normal forms – general definition of second and third normal forms – Boyce-Codd normal form – multi-valued dependencies and fourth normal form – join dependencies and fifth normal form – inclusion dependencies – practical database design tuning – database design process relational model concepts – relational algebra operations – queries in SQL – insert – delete and update statements in SQL – views in SQL.

Module IV(8hrs)

Transaction processing – desirable properties of transaction, schedules and recoverability – serializability of schedules concurrency control – locking techniques – time stamp ordering multi version concurrency control – granularity of data items.

Module V(8hrs)

Database recovery techniques based on deferred up data and immediate updating – shadow pages – ARIES recovery algorithm – database security and authorization – security issue

access control based on granting/revoking of privileges – introduction of statistical database security

Text Book

1. Elmasri and Navathe, Fundamentals of Database Systems, Addison Wesley

Reference Book

1. Silberschatz A, Korth H.F and Sudarshan S, Database System Concepts, Tata McGraw Hill
2. Ramakrishnan R.& Gehrke J., *Database Management Systems*, Third edition, 2003, McGraw Hill
3. S K Singh, *Database Systems-Concepts, Design and Applications*, Pearson Education, 2006

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 204 OPERATING SYSTEMS

Objectives

- To impart the knowledge on the need and requirement of an interface between Man and Machine; to enable the learners to identify the difference between the system software and the application software and their design requirements.
- To teach the features of operating systems and the fundamental theory associated with process, memory and file management components of operating systems

Module I (12hrs)

Review of operating system strategies – resources – processes –threads – objects – operating system organization – design factors – functions and implementation considerations – devices – characteristics – controllers – drivers – device management – approaches – buffering – device drivers – typical scenarios such as serial communications – storage devices etc.

Module II (12hrs)

Process management – system view – process address space – process and resource abstraction – process hierarchy – scheduling mechanisms – various strategies – synchronization – interacting and coordinating processes – semaphores – deadlock – prevention – avoidance – detection and recovery.

Module III (12hrs)

Memory management – issues – memory allocation – dynamic relocation – various management strategies – virtual memory – paging – issues and algorithms – segmentation – typical implementation of paging and segmentation systems.

Module IV (10hrs)

File management – files – implementation –storage abstraction – memory mapped files – directories and their implementation

Module V(8hrs)

Protection and security – policy and mechanism – authentication – authorization – case study of UNIX kernel and Microsoft windows NT (concept only)

Reference Book

1. Nutt G.J, Operating Systems – A Modern Perspective, Addison Wesley
2. Silberschatz and Galvin, Operating System Concepts, Addison Wesley
3. Crowley C, Operating Systems-A design Oriented Approach, Tata McGraw Hill
4. Tanenbaum A S, Modern Operating Systems, Prentice Hall, Pearson Education

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 205 DATA STRUCTURES

Objectives

- *To impart the basic concepts of continuous data structures*
- *To develop understanding about fundamental searching and sorting techniques*

Module I(12hrs)

Review of data types – scalar types – primitive types – enumerated types – subranges structures types – character strings – arrays – records – sets – files – data abstraction – complexity of algorithms – time and space complexity of algorithm using 'big oh' notation – recursion – recursive algorithms – analysis of recursive algorithms.

Module II(12hrs)

Linear data structures – stacks – queues – lists – stack and queue implementation using array – linked list – linked list implementation using pointers.

Module III(12hrs)

Nonlinear structures – graphs – trees – sets – graph and tree implementation using array and linked list – set implementation using bit string and linked list.

Module IV(12hrs)

Searching – sequential search – searching arrays and linked lists – binary search – searching arrays and binary search trees – hashing – introduction to simple hash functions – resolution of collisions

Module V(12hrs)

Sorting – n2 sorts – bubble sort – insertion sort – selection sort – NlogN sorts – quick sorts – heap sort – merge sort – external sort – merge files.

Reference Books

1. Aho A.V, Hopcroft J E, Ullman J D, Data Structures and Algorithms, Addison Wesley
2. S. Sahni, *Data structures, Algorithms, and Applications in C++*, McGraw Hill, 1998
3. Wirth N, Algorithms+ Data Structures=Programs, Prenticed Hall
4. Cormen T.H., Leiserson C.E, Rivest R.L. and Stein C, Introduction to Algorithms, MIT Press,

Modules I, II and III.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 206(P) SOFTWARE LAB II

Objectives

- *To give hands on experience in viewing data as the central resource in computing process and to visualize the importance of structuring data.*
- *To demonstrate the impact of organizing data on the efficiency of algorithms that process the data, including static and dynamic data structures as well as linear and nonlinear data structures.*

SET I (3 Labs)

Stack and Queue: Implementation using arrays and Linked lists

Searching Methods: Binary search and Hashing

Sorting: Recursive implementation of Quick Sort and Merge Sort

SET II (2 Labs)

Binary Search Tree: Implementation with insertion, deletion and traversal

Infix Expression Evaluation: Using expression tree

SET 1V (3 Labs)

Graph Search Algorithms: DFS and BFS on a connected directed graph

Minimal Spanning Tree: Implementation of Kruskal's and Prim's Algorithms

Shortest Path Algorithms: Dijkstra and Floyd Warshall Algorithms

SET V (2 Labs)

Disjoint Set operations: Union and Find using rank and path compression.

Applications of Heap: Priority Queue and Heap Sort.

References:

1. T. H. Cormen, C. E. Lieserson, R. L. Rivest, *Introduction to Algorithms*, PHI, 1998
2. S. Sahni, *Data structures, Algorithms, and Applications in C++*, McGraw Hill, 1998
3. Balaguruswamy E, Object Oriented Programming with C++, McGraw Hill
4. Bruce Eckel, Thinking in C++, 2/ed. Vol I and II, Prentice Ball India (Available online at www.bruceeckel.com)
5. Herbert Schilbt, C++ - the complete reference, TMH 2002

Sessional work assessment

Lab practicals and record	= 30
Tests	= 20
Total	= 50

SEMESTER - 3

MCA10 301 NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

Objective

- This course is indented to familiarize the learners with the various techniques in numerical analysis. The course also aims to introduce the concept of optimization via standards methods for solving linear programming and allied problems. A familiarity with these applications is essential for any specialist in computer applications.

Module I: (10 hrs)
Errors in numerical calculations - sources of errors - significant digits - numerical solution of polynomial and transcendental equations - bisection method - regula-falsi method - Newton-Raphson method - fixed point method of iteration - rates of convergence of these methods - solution of system of algebraic equations - exact methods - Crout's triangularization method - iterative methods - Gauss-Seidel and relaxation methods

Module II: (10 hrs)
Polynomial interpolation - Lagrange interpolation polynomial - divided differences – Newton's divided difference interpolation polynomial - finite differences - operators $\Delta, \nabla, e, \delta$-Gregory - Newton forward and backward difference interpolation polynomials - central differences – Stirling's interpolation formulae

Module III: (10 hrs)
Numerical differentiation - differentiation formulae in the case of equally spaced points - numerical integration - trapezoidal and Simpson's rules - compounded rules - errors of interpolation and integration - formulae for numerical solution of ordinary differential equations – single-step methods - Taylor series method – Euler's method - modified Euler's method – Picard's iteration method - Runge - Kutta methods (2nd, 3rd and 4th order formulae - derivations not required) - multistep methods – Milne's predictor and corrector formulae

Module IV: (12 hrs)
Optimization methods - mathematical formulation of linear programming problem - simplex method - artificial variables – Charne's M-method – two-phase technique - duality in linear programming - dual simplex method

Module V: (8 hrs)
Transportation, assignment problems and routing problems

Reference books

1. Sastry S.S., *Numerical Analysis*, Prentice Hall India
2. Froberg, *Introduction to Numerical Analysis*, Addition Wesley
3. Salvadori & Baron, *Numerical Methods in Engineering*, Prentice Hall India
4. Gerald, *Applied Numerical Analysis*, Addison Wesley
5. Grawin W.W., *Introduction to Linear Programming*, McGraw Hill
6. Gass S.I., *Introduction to Linear Programming*, Tata McGraw Hill

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 302 COMPUTER NETWORKS

Objectives

- *To teach the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols.*

MODULE I (6 Hrs)

Introduction - uses of computer networks – application – network hardware Local Area Networks: (LAN – MAN – WAN) Ethernet, Token Ring Media Access Control, Token Ring Maintenance, FDDI, Resilient Packet Ring, Wireless: Bluetooth, Wi-Fi, WiMAX- network protocols and standards, standards of organizations. Basic concepts : line configuration, topology, transmission mode, classifications. OSI model: functions of the layers

MODULE II (7 Hrs)

Cell Phone Technologies. Circuit switching, Message switching, Packet Switching - Datagrams, Virtual circuit, source routing, Cell Switching - Cells, Segmentation and Reassembly, Virtual Paths, ATM design goals, Physical Layers for ATM.

Module III (13 Hrs)

Internetworking - Networking devices - Bridges, Routers, Gateways, Routing- Network as a graph, distance vector (RIP), link state (OSPF), Metrics, Routing for mobile hosts, Global Internet - Subnetting, CIDR, BGP, Routing areas.

Module IV (13Hrs)

Internetworking - IPv4 and IPv6, Multicast addresses, Multicast routing, DVMRP, PIM, MSDP, Multiprotocol label switching- Destination based forwarding, Explicit routing, virtual private networks and tunnels.

Module V (13 Hrs)

End-to-End Protocols: Transport layer – duties, Simple Demultiplexer (UDP), Reliable byte Stream (TCP). end-to-end issues - segment format, connection establishment and termination, Triggering transmission, Adaptive retransmission, record boundaries. TCP extensions,

Alternative design choices. Remote Procedure Call Fundamentals, RPC Implementation, Upper OSI layers - session layer, presentation layer, application layer.

Text Books

1. Behrouz Forouzan, Introduction to data communication and networking, Tata McGraw- Hill Publishing Company Ltd.
2. L. Peterson & Bruce S. Davie, Computer Networks- A systems approach, 4/e Morgan Kaufmann publishers an imprint of Elsevier

Reference Books

1. Halsall F., Data Communication, Computer Networks and Open Systems, Addison Wesley.
2. Keshav S, An Engineering Approach to Computer Networking, AWL.
3. Andrew S. Tanenbaum, Computer Networks, PHI.
4. Leon-Garcia A. & Widjaja I., Communication Networks, Tata McGraw Hill

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 303 PRINCIPLES OF COMPILER DESIGN

Objectives

- *To introduce the various techniques involved in the translation of source programs into object programs by a compiler.*
- *To understand the inner working of a compiler using the various data structures used in the translation process.*

MODULE I (10 Hrs)

Introduction: Analysis of the source program, phases of a compiler, compiler construction tools. Lexical analysis: Role of the lexical analyzer, specification of tokens, Recognition of tokens, Lexical analyzer generators.

MODULE II (13Hrs)

Syntax analysis: Top-down parsing-Recursive descent and Predictive Parsers. Bottom-up Parsing- LR (0), SLR, and LR (1) Parsers.

MODULE III (13 Hrs)

Syntax-directed translation: Syntax-directed definitions, S-Attributed definitions, L-attributed definitions, Bottom-up and top-down translation - Type checking: Type systems, specification of a type checker and symbol tables.

MODULE IV (8 Hrs)

Intermediate code generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Procedure calls.

MODULE V (8 Hrs)

Run-time environments: Source language issues, storage organization, storage allocation strategies, Introduction to code optimization: Sources of optimization

Reference Books

1. AHO, A. V, SETHI, R. and ULLMAN, J. D. Compilers: Principles, Techniques and Tools, Addison Wesley,
2. Steven S Muchnick, Advanced Compiler Design Implementation.
3. STEVEN MUCHNICK. Advanced Compiler Design Implementation, Morgan Kauffmann Publishers, 1997

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 304 CORE JAVA

Objectives

Module I(10 hrs)

Review of object oriented fundamentals: Object oriented programming, Encapsulation, Inheritance, Polymorphism Java Fundamentals: Java features, JVM, Java program structure, Reserved keywords, Identifiers, Literals, Operators, Separators, Variables, Declaring a variable, Scope and lifetime of variables, Data types, Arrays, Strings.

Module II(12 hrs)

Operators, Control Structures, Classes : Constructors, Method Overloading, Static Classes, Inheritance, Method overriding, Final variables, methods and classes, Abstract methods and classes, Wrapper classes, Packages and Interfaces.

Module III(10 hrs)

Exception Handling: Exception as Objects, Exception hierarchy, Try, Catch, Finally, Throw, Throws. Multithreading: Thread basics, Multithreading advantages and issues, Creating and running threads, stopping and Blocking Threads, Thread life cycle, Thread priority, Exceptions, Synchronization

Module IV(12 hrs)

I/O Package: Stream Classes, Filtered Streams, Buffered Streams, Random access file, Object Serialization, GUI: Introduction to AWT Programming, Window fundamentals, Container Class, Frame windows, Creating a frame window, Displaying information within a window, Layout and Component managers, Event handling, Drawing lines, Arcs, Rectangles, Polygon, Ellipse

Applets: Applets class, Applet life cycle, Passing parameters to Applets

Module V(10 hrs)

Networking : Networking basics, Java and the Net, InetAddress, TCP/IP Client and Server Sockets, URL connection, Datagrams,

Database Connectivity: JDBC architecture, Establishing Connectivity and Working with connection interface, working with statements.

Text Book

1. Patrick N & Schildt H, Java 2 The Complete Reference, Tata McGraw Hill

Reference Books

1. Patrick Naughton, Java Handbook, Tata McGraw Hill
2. H.M.Dietel & P J Deitel Java : How to program, PHI
3. Jamie Jaworski, Java 2 Platform Unleashed : The comprehensive solution, SAMS Techmedia

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 305 PRINCIPLES OF ACCOUNTING AND FINANCIAL MANAGEMENT

Objectives:

- To enable students to familiarize with the basic concepts in accounting and financial management.(Focus must be laid on fundamental principles rather than doing complicated problems).

Module-I (10 Hrs)

Financial accounting-scope and functions-accounting conventions and concepts-recording of business transactions-Journal-ledger, Cash book-Trial Balance. Role of computers in financial accounting

Module-II (12 Hrs)

Preparation of final accounts-Trading account, Profit and loss account and Balance sheet with adjustments-Depreciation methods of providing depreciation- Accounting standards in India

Module-III (10 Hrs)

Analysis and interpretation of financial statements-Ratio analysis-meaning and significance-classification of ratios- common size statements-comparative analysis-Trend Analysis

Module-IV (10 Hrs)

Financial Management-Nature scope and objectives-overcapitalization and undercapitalization –cost of capital- working capital-factors affecting working capital-operating cycle

Module-V(10 Hrs)

Cost concepts-elements of cost-cost sheet -Marginal costing-practical applications in business decisions - Cost volume profit analysis-Break even analysis-Budgetary control-nature & Scope. Nature and scope of standard costing-variance analysis-Meaning and significance of capital budgeting decisions.-Capital market-mutual funds market (13 Hrs)

Note:-

Sixty percent questions should be from problem and the remaining forty percent from Theory part

References:-

1. Financial Accounting : Ashoka Banerjee -Excel Publications
2..Finanacial accounting and Management : Ambariosh Gupta - Pearson Education
3. Fundamentals of Financial Accounting : Narayana Swamy
4. Introduction to Accounting : Pru Mariott and J.R.Edwards-Sage publications
5. Management Accounting : Man Mohan & Goyal -Sultan Chand &Co.
6. Financial Management : I.M.Pandey

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 306(P) SOFTWARE LAB - III

SET 1 (2 labs)

Familiarization of the MySQL database – creation and manipulation of tables

SET 2 (3 Labs)

Analyze the given situations, develop an ER model and convert the ER model to Relational model. Implement the database using MySQL and manipulate the tables using SQL commands.

SET 3 (2 labs)

Implement a database stored in an RDBMS accessible through a web browser

SET 4 (2 labs)

Implementation of B Trees

References:

1. Elmasri, Navathe, ‘Fundamentals of Database Systems’, 4/e, Pearson Education
2. Reghu Ramakrishnan, Databse Management Systems, McGrawHill

Sessional work assessment	
Lab practicals and record	= 30
Tests	= 20
Total	= 50

SEMESTER - 4

MCA10 401 CRYPTOGRAPHY AND NETWORK SECURITY

Objectives

- *To introduce the principles and practices of cryptography and network security.*
- *To discuss algorithms and schemes to handle the security issues.*
- *To introduce web security .*

Module I: (13 hrs)
Divisibility: gcd and lcm, prime numbers, fundamental theorem of arithmetic, Gauss function , *Congruence*: properties-complete and reduced residue systems-Fermat's theorem- Euler function. *Congruence in one unknown*: Congruence in First degree- Chinese remainder theorem

Module II: (10 hrs)
Introduction to cryptography: services, mechanisms and attacks- The OSI security architecture- A model for network security, *Classical Encryption Techniques*: Symmetric cipher model-Substitution techniques-transposition techniques-Rotor machine- steganography, *Modern Techniques:* Simplified DES- DES- block cipher principles- cryptanalysis- block cipher design principles.

Module III: (10 hrs)
Algorithms - Triple DES- IDEA- blowfish. *Confidentiality*: placement of encryption function- traffic confidentiality- key distribution- random number generation. *Public key encryption* : RSA algorithm- key management and exchange- elliptic curve cryptography.

Module IV: (9 hrs)
Message Authentication: requirements- functions and codes- hash functions- security of hash functions and MACS. *Hash Algorithms:* MD5 message digest algorithm- secure hash algorithm. *Digital Signatures*: authentication protocols- digital signature standard. *Authentication Applications:* Kerberos.

Module V: (10 Hrs)
Electronic Mail Security : Pretty Good Privacy – S/MIME , *Web Security*: SSL and Transport Layer Security- Secure electronic transaction, *Firewalls:* Design Principles- Trusted Systems

Text Books:

1. C.Y Hsiung , Elementary Theory of Numbers, Allied Publishers (World Scientific), New Delhi, 1992 (Module I)
2. W. Stallings, Cryptography and Network Security , Principles and Practices, 2/e, Pearson education Asia, 1999 (Module II, III, IV, V)

References:

1. Niven and H.S .Zuckerman, An introduction to the Theory of Numbers, 3/e, John Wiley and Sons, NewYork , 1992
2. B. Schiner, Applied Cryptography: Protocols, Algorithms, and Source code in C, 2/e, John Wiley and Sons, NewYork, 1996

Sessional work assessment
Assignments 2x10 = 20

Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 402 SOFTWARE ARCHITECTURE AND PROJECT MANAGEMENT

Objectives

- *To impart the basic concepts of software architecture and design patterns.*
- *To develop an understanding about development of complex software systems in a methodical manner.*

Module I (13 hrs)

Software Architecture - Foundations - Software architecture in the context of the overall software life cycle - Architectural Styles - CASE study of Architectures Designing, Describing, and Using Software Architecture - IS2000: The Advanced Imaging Solution - Global Analysis - Conceptual Architecture View - Module Architecture View - Styles of the Module Viewtype - Execution Architecture View, Code Architecture - View. Component-and-Connector Viewtype - Styles of Component-and-Connector Viewtype - Allocation Viewtype and Styles - Documenting Software Interfaces, Documenting Behavior - Building the Documentation Package.

Module II (11 hrs)

Archetypes and Archetype Patterns, Model Driven Architecture with Archetype Patterns. Literate Modeling, Archetype Pattern. , Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rule Archetype Pattern. Design Patterns, Creational Patterns, Patterns for

Organization of Work, Access Control Patterns, Service Variation Patterns, Service Extension Patterns

Module III (13 hrs)

Object Management Patterns Adaptation Patterns, Communication Patterns, Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems Adaptable Systems, Frameworks and Patterns, Analysis Patterns Patterns for Concurrent and Networked Objects, Patterns for Resource Management, Pattern Languages, Patterns for Distributed Computing.

Module IV (7 hrs)

Defining EAI, Data-Level EAI, Application Interface-Level EAI., Method- Level EAI., User Interface-Level EAI, The EAI Process - An Introduction to EAI and Middleware, Transactional Middleware and EAI, RPCs, Messaging, and EAI, Distributed Objects and EAI, Database-

Oriented Middleware and EAI, Java Middleware and EAI, Implementing and Integrating Packaged Applications

Module V (8 Hrs)

The General Idea, XML and EAI, Message Brokers—The Preferred EAI Engine, Process Automation and EAI. Layering, Organizing Domain Logic, Mapping to Relational Databases, Web Presentation, Domain Logic Patterns, Data Source Architectural Patterns, Object-Relational Behavioral Patterns, Object-Relational Structural Patterns, Object-Relational Metadata Mapping Patterns, Web Presentation Patterns, Distribution Patterns, Offline Concurrency Patterns.

Reference Books

1. Ian Gorton Springer, *Essential Software Architecture*, 1st edition, 2006.
2. Bob Hughes, Mike Cotterell, *Software Project Management, 4th edition,* Tata McGraw Hill, 2006.
3. Christine Hofmeister, Robert Nord, Deli Soni , *Applied Software Architecture*, Addison-Wesley Professional; 1st edition, 1999.
4. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *Design Patterns: Elements of Reusable Object-Oriented Software,* Addison-Wesley Professional; 1st edition.
5. Martin Fowler, *Patterns of Enterprise Application Architecture*, Addison- Wesley Professional, 2003.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 403 WEB PROGRAMMING

Objectives:

- To impart the concepts of web programming techniques.
- To understand how a web program can be developed.

Module I (10 hrs)

Internet and WWW, Creating Web Graphics, HTML, Paintshop, Photoshop, FrontPage, Introduction to XHTML, Cascading Style Sheets.

Module II (12 hrs)

Introduction to Scripting, JavaScript: Control Statements, Functions, Arrays, Objects, Dynamic HTML: Object Model and Collections, Filters and Transitions, Data Binding with Tabular Data Control

Module III (10 hrs)

Building Interactive Animations, Extensible Markup Language (XML), Web Servers, Database: SQL, MySQL, DBI

Module IV (10 hrs)

Active server pages, CGI and, PHP. (concept only)

Module V (10 hrs)

Introduction to JSP – use – compared to ASP and Servlets – Architecture – JSP environment – using tags – declaration tag – expression tag – directive tag – scriptlet tag – action tag – implicit object – session tracking.

Reference Books

1. H. M. Deitel, P. J. Deitel and T. R. Nieto, Internet and World Wide Web: How To Program, Pearson Education, 2000.
2. Harvey Deitel, Paul Deitel, Tem Nieto, Complete Internet & World Wide Web Programming Training Course, Student Edition, 2/e, Prentice Hall , 2002

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 406(P) Mini Project

Objectives

- *To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of a computer / information system.*
- *For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.*

In this practical course, each group consisting of three/four members is expected to design and develop a moderately complex computer / information system with practical applications; this should be a working model. The basic concepts of product design may be taken into consideration while designing the project. A committee consisting of minimum three faculty members specialised in computer science and engineering will perform assessment of the mini project. Students have to submit a report on the mini project and demonstrate the mini project before the evaluation committee.

The division of the total marks is into two namely, 60% of the total marks to be awarded by the guide / Co-ordinator and the remaining 40% by the evaluation committee.

Internal Continuous Assessment *(50 marks)*
40% - Design and development
30% - Final result and Demonstration
20% - Report
10% - Regularity in the class

SEMESTER - 5

MCA10 501 COMPUTER GRAPHICS AND MULTIMEDIA

Objectives

- *To teach the fundamentals of computer graphics including algorithms for drawing 2D and 3D primitives, object transformations and the like.*
- *To understand the overview of multimedia systems and various data compression techniques.*

Module I: (11 hrs)

Introduction to Computer Graphics, Basic raster graphics algorithms for drawing 2D primitives: scan converting lines, circles, ellipses - filling polygons - clipping lines, circles, ellipses, polygons - generating representation of transformations

Module II: (11 hrs)

Homogenous coordinates and matrix techniques: Interaction hardware - basic interaction tasks - user interface software.3D graphics: viewing in 3D - projections - basics of solid modeling - 3D transformations.

Module III: (8 hrs)

Introduction to multimedia : Media and Data Streams - properties of a Multimedia systems - Building Blocks : Audio : Basic sound concepts - Music - Speech - MIDI versus Digital Audio - Audio file formats - sound for the web

Module IV: (8 hrs)

Images and Graphics: Basic concepts - Computer image processing. Video and Animation: Basic concepts - Animation techniques - Animation for the web.

Module IV: (14 hrs)

Data compression : Storage space and coding requirements - classification of coding compression techniques - Basic compression techniques like JPEG, H.261, MPEG and DVI.

Text Books

1. Foley J D, Van Dam A, Feineer S K & Hughes J F, Computer Graphis Principles and Practices, Addison Wesley
2. Ralf Steinmetz & Klara Nahrstedt Multimedia: Computing Communications and and Applications, Pearson Education

Reference:

1. Rogers D. F, *Procedural Elements for Computer Graphics*, McGraw Hill.
2. Newmann W and Sproull R. F, *Principles of Intractive Computer Graphics*, McGraw Hill.

3. Hearn D and Backer P.M, *Computer Graphics*, Prentice Hall India.
4. Koegel Buford J.F, *Multimedia System*, Addison Wesely.
5. Vaughan T, *Multimedia : Making it work*, McGraw Hill.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 502 WIRELESS COMMUNICATION

Objectives:

- *This introductory course is intended to introduce the basics of wireless and mobile networks in the context of the recent trends in this area and their proliferation in day to day life. Local Area Network (LAN), Wide area Network (WAN) and Inter networking are dealt with.*

Module I (8 hrs)

Introduction, wireless transmission - frequencies for radio transmission - signals - antennas - signal propagation - multiplexing - modulation - spread spectrum - cellular systems - medium access control - specialized MAC - SDMA - FDMA - TDMA - aloha - CSMA - collision avoidance - polling - CDMA - comparison of S/T/F/CDMA

Module II (10 hrs)

Telecommunication systems - mobile services - system architecture - radio interface - protocols - localization and calling - handover - security - new data services - satellite systems- GPS- broadcast systems - digital audio broadcasting - digital video broadcasting, WDM Optical networks.

Module III (12 hrs)

Mobile network layer - mobile IP - packet delivery - registration - tunneling and encapsulation - optimizations - reverse tunneling - dynamic host configuration protocol-Mobile Transport Layer-TCP-Indirect TCP-Snooping TCP-Mobile TCP-retransmission-recovery-transaction oriented TACP

Module IV (12 hrs)

Wireless LAN-Infra red Vs radio transmission -infra structure and adhoc networks-IEEE 802.11 b/a/g-bluetooth-IEEE 802.16,adhoc networks - routing - algorithms - metrics .

Module V (10 hrs)

WAP-Design and principles of operations,WAP architecture Overview-WAP model-WAP architecture components-WAE overview-WWW model-WAE model-WTA architecture

overview-Wireless session protocol specifications-Wireless transaction protocol specification-Wireless transport layer security specification-Wireless datagram protocol-wireless control message protocol specification.

TEXT BOOKS

1. Schiller J.***Mobile Communications, 2/e***, Pearson Education, 2003.
2. Gray.S.Rogers,John Edwards ***An Introduction to Wireless Technology***,Pearson Education

References

1. C.Siva Ram Murthy, ***Ad Hoc Wireless Networks: Architectures and Protocols***, Pearson Education, 2004.
2. Singhal et.al S., ***The Wireless Application Protocol***, Addison Wesley
3. C. Siva Ram Murthy, ***WDM Optical Networks: Concepts, Design, and Algorithms***, Pearson Education.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 503 OBJECT ORIENTED MODELING AND DESIGN

Objectives:

- To give concepts of OOPs UML and Architecture diagrams

Module 1 (6 hrs)

Overview of object-oriented systems, objects, attributes, encapsulation, class hierarchy, polymorphism, inheritance, messages, history of object orientation.

Module 2 (12 hrs)

Introduction to UML, basic expression of classes, attributes, and operations, Class diagrams**:** generalization and association constructs, composition and aggregation**.** Use case diagrams, Object interaction diagrams**:** collaboration diagrams, sequence diagrams, asynchronous messages and concurrent execution**.** State diagrams**:** basic state diagrams, nested states, concurrent states and synchronisation, transient states**.** Activity diagrams

Module 3 (6 hrs)

Architecture diagrams **:** packages, deployment diagrams for hardware artifacts and software constructs **.** Interface diagrams**:** window-layout and window-navigation diagrams**.**

Module 4 (14 hrs)

Encapsulation structure, connascence, domains of object classes, encumbrance, class cohesion, state-spaces and behavior of classes and subclasses, class invariants, pre-conditions and post-conditions, class versus type, principle of type conformance, principle of closed behavior.

Module 5 (14 hrs)

Abuses of inheritance, danger of polymorphism, mix-in classes, rings of operations, class cohesion and support of states and behavior, components and objects, design of a component, light weight and heavy weight components, advantages and disadvantages of using components.

Reference books

1. Page-Jones .M, Fundamentals of object-oriented design in UML, Addison Wesely
2. Booch. G, Rumbaugh J, and Jacobson. I, The Unified Modelling Language User Guide, Addison Wesely.
3. Bahrami.A, Object Oriented System Development, McGrawHill.
4. Booch. G, Rumbaugh J, and Jacobson. I, The Unified Modelling Language Reference Manual, Addison Wesely.
5. Larman.C, Applying UML & Patterns: An Introduction to Object Oriented Analysis & Design, Addison Wesley
6. Pooley R & Stevens P, Using UML: Software Engineering with Objects & Components, Addison Wesley.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA2010 506(P) **Seminar**

Each student shall prepare and present a paper on any topic in the field of computer Science.

Sessional work assessment	
Presentation	30
Seminar report	20
Total marks	50

ELECTIVE SUBJECTS

MCA10 404 A ARTIFICIAL INTELLIGENCE

Objectives

- To give basic concepts in AI application.
- To understand how software is developed using AI concept.

Module I(16 Hrs)

Introduction: Definition and basic concepts, Aims ,Approaches, Problems in AI, AI applications perception and action, Representing and implementing action functions ,Production systems, Network problem solving Methods: Forward versus Backward reasoning ,Search in state spaces, State space graphs Uniformed search, Breadth First Search, Depth First Search, Heuristic search using evaluation functions, General graphs searching Algorithm, Algorithm A*, Admissibility of A*,The consistency condition, Iterative deepening A*,Algorithm AO*,Heuristic functions and search deficiency. Alternative search formulations and applications, Assignment problems, Constraint satisfaction, Heuristic repair, Two age games, the mini max search, Alpha Beta procedure, Game of chance.

Module II(6 Hrs)

Knowledge representation, The propositional Calculus, Using constrains on feature values, language ,Rules of inference, Definition of Proof, semantics, Soundness and completeness, The Problem, Meta-theorems, Associative and Distributive laws, Resolution in propositional calculus, Soundness of Resolution, Converting arbitrary wffs to conjunction of clauses, Resolutions refutations, clauses.

Module III(8 Hrs)

The Predicate calculus, Motivation, The language and its syntax, Semantics, Quantifications, Semantics of quantifiers, Resolution in predicate Calculus, Unification, Converting arbitrary wffs to clause form - using resolution to prove theorems, Answer extraction. Knowledge representation by networks - Taxonomy knowledge - Semantic networks, Frames, Scripts.

Module IV(12 Hrs)

Neural Networks: Introduction, Motivation, Notation, The Back propagation method, Generalization and accuracy, reasoning with uncertain information, Review of Probability theory, Probabilistic inference, Bayes networks, Genetic programming, Program representation in GP, The GP process. Communication and integration, Interacting agents, A model logic of knowledge, Communication among agents, Speech acts, Understanding language strings, Efficient communication, Natural language processing Knowledge based Systems, Reasoning with Horn clauses, Rule based Expert systems.

Module V(10 Hrs)

Programming in LISP: Basic LISP primitives, Definitions, Predicates, Conditionals, And Binding, Recursion and Iteration ,Association lists, Properties and Data abstraction, Lambda expressions, Macros, I/O in LISP, Examples involving arrays and search.

Text Book

1. Nilsson N J, Artificial Intelligence – A new Synthesis Harcourt Asia Pvt. Ltd

Reference Books

1. Stuvert Russel, Peter Norvig, Artificial Intelligence – A Modern Approach, Prentice hall India
2. Luger G F, Stubblefield W A, Artificial Intelligence, Addison Wesley
3. Elain Rich, Kevin night, Artificial Intelligence, Tata McGraw Hill
4. Tanimotto S L, The Elements of Artificial Intelligence, Computer Science Press
5. Winston P H, LISP, Addison Wesley

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 404 B IMAGE PROCESSING

Objectives

- .To teach basic concepts of digital image processing

Module I: 10hrs

Introduction – digital image representation – fundamental steps in image processing – elements of digital image processing systems – digital image fundamentals – elements of visual perception – a simple image model – sampling and quantization – basic relationship between pixels – image geometry I

Module II: 10hrs

Image transforms – introduction to Fourier transform – discrete Fourier transform – some properties of 2-fourier transform (DFT) – the FFT – other separable image transforms – Hotelling transform

Module III: 12hrs

Image enhancement – point processing – spatial filtering – frequency domain – color image processing – image restoration – degradation model – diagonalization of circulant and block circulant matrices – inverse filtering – least mean square filter

Module IV: 10hrs

Image compression – image compression models – elements of information theory – error-free compression – lossy compression – image compression standards

Module V: 10hrs

Image reconstruction from projections – basics of projection – parallel beam and fan beam projection – method of generatin projections – Fourier slice theorem – filtered back projectin algorithms – testing back projection algorithms

Text Book

1. Rafel C, Gonazalez and Wood R.E, Digital Image Processing , Addison Wesley

Reference Books

1. Rosenfeld A, Kak A C., Digital Picture Processing, Academic Press
2. Jain AK, Fundamentals of Digital Image Processing, Prentice Hall
3. Schalkoff R J, Digital Image Processing and Computer Vision, John Wiley
4. Patt W K, Digital Image Processing, John Wiley

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 404 C ADVANCED DATABASE MANAGEMENT SYSTEMS

Objectives:

- To study the concept of object oriented databases, distributed databases and deductive databases.
- To impart basic concepts of data warehousing , data accessing from databases and information systems.

Module I: 11hrs

Overview of relational database concept – object oriented database – overview of object oriented concepts – object definition language – object query language – object database conceptual design – overview of CORBA standard for distributed objects

Module I: 13hrs

Distributed database concepts – data fragmentation replication and allocation type of distributed database system – query process – concurrency control for distributed database – overview of client-server architecture and its relationship to distributed database

Module III: 8hrs

Deductive database – introduction to deduction database prolog/datalog notation – interpretation of rules – basic inference mechanism for logic programs – datalog programs and their evaluation – deduction database systems

Module IV: 8hrs

Data ware housing and data mining – database on WWW – multimedia database – mobile database – geographic information system – digital libraries

Module V: 12hrs

Oracle and Microsoft access – basic structure of the oracle system – database structure and its manipulation in oracle – storage organization programming oracle applications – oracle tools – an overview of Microsoft Access features and functionality – distributed database in oracle.

Text Book

1. Elmasri and Navathe, Fundamentals of Database Systems, Addison Wesley

Reference Books

1. Ramakrishnan R. & Gehrke J *Database Management Systems*, 3rd Edition., McGraw Hill.
2. Connolly and Begg, Database systems, 3rd Edition, Pearson Education, 2003
3. O'neil P. & O'neil E *Database Principles, Programming and Performance*, 2nd Edition., Harcourt Asia (Morgan Kaufman).
4. Silberschatz, Korth H. F. & Sudarshan S, *Database System Concepts*, Tata McGraw Hill.

Sessional work assessment

Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 405 A DESIGN AND ANALYSIS OF ALGORITHM

Objectives

- To provide a sound basis of algorithm design and analysis techniques.
- To introduce the various computing models and their capabilities with respect to computing

Module I (13 hrs)

Analysis: RAM model - cost estimation based on key operations - big Oh - big omega - little Oh - little omega and theta notations - recurrence analysis - master's theorem - solution to recurrence relations with full history, probabilistic analysis - linearity of expectations - worst and average case analysis of quick-sort - merge-sort - heap-sort - binary search - hashing algorithms - lower bound proofs for the above problems - amortized analysis - aggregate - accounting and potential methods - analysis of Knuth-Morris-Pratt algorithm - amortized weight balanced trees

Module II (13 hrs)

Design: divide and conquer - Strassen's algorithm, o(n) median finding algorithm - dynamic programming - matrix chain multiplication - optimal polygon triangulation - optimal binary search trees - Floyd-Warshall algorithm - CYK algorithm - greedy - Huffman coding - Knapsack, Kruskal's and Prim's algorithms for mst - backtracking - branch and bound - travelling salesman problem - matroids and theoretical foundations of greedy algorithms

Module III (13 hrs)

Complexity: complexity classes - P, NP, Co-NP, NP-Hard and NP-complete problems - cook's theorem (proof not expected) - NP-completeness reductions for clique - vertex cover - subset sum - hamiltonian cycle - TSP - integer programming - approximation algorithms - vertex cover - TSP - set covering and subset sum

Module IV (7 hrs)

Introduction to parallel systems : PRAM models – EREW, ERCW, CREW, and CRCW – relation between various models – handling read write conflicts – work efficiency – Brent’ s theorem

Module IV (6 hrs)

Parallel merging – sorting and connected components, list rank, Euler tour technique – parallel prefix computation – deterministic summetry breaking

Text Books:

1. Cormen T.H., Leiserson C.E, Rivest R.L. and Stein C, Introduction to Algorithms, Prentice Hall India,

   New Delhi, 2004, Modules I, II and III.

2. Motwani R. & Raghavan P., Randomized Algorithms, Cambridge University Press, Module IV

References:

1. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Pearson Education. 2003
2. Basse S., Computer Algorithms: Introduction to Design And Analysis, Addison Wesley.
3. Manber U., Introduction to Algorithms: A Creative Approach, Addison Wesley
4. Aho A. V., Hopcroft J. E. & Ullman J. D., The Design And Analysis of Computer Algorithms, Addison Wesley

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 405 B SIMULATIONS AND MODELING

Module I: (6 Hrs)

Introduction: system and models- computer simulation and its applications – continuous system simulation- modeling continues systems- simulation of continuous system- discrete system simulation- methodology- event scheduling and process interaction approaches.

Module II: (6 hrs)

Random number generation- testing of randomness-generation of stochastic variates- random samples from continuous distributions- uniform distribution- exponential distribution m-Erlang distribution- gamma distribution-normal distribution- beta distribution- random samples from discrete distribution- Bernoulli- discrete uniform- binomial- geometric and Poisson.

Module III: (10 hrs)

Evaluation of simulation experiments- verification and validation of simulation experiment-statistical reliability in evaluating simulation experiments- confidence intervals for terminating simulation runs- simulation languages- programming considerations- general features of GPSS- SIM SCRIPT and SIMULA.

Module IV: (15 hrs)

Simulation of queuing systems- parameters of queue- formulation of queuing problems-generation of arrival patterns- generation of service patterns- simulation of single server queues- simulation of multi server queues- simulation of random queues.

Module V: (15 hrs)

Simulation of stochastic network- simulation of PERT network- definition of network diagram-forward pass computation- simulation of forward pass- backward pass computation-simulation

of backward pass- determination of float and slack times determination of critical path- simulation of complete network- merits of simulation of stochastic networks.

TEXTBOOK

1. Deon N, *System Simulation And Digital Computer,* Prentice Hall of India.

Reference:

1. Gordan G, *System Simulation ,* Prentice Hall of India.
2. Law A M and Ketton W D, *Simulation Modeling and Analysis*, McGraw Hill.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 405 C EMBEDDED SYSTEMS

Objectives

- *To teach students about architecture, hardware and software elements, programming models and practices and tools for embedded system design and implementation.*
- *To focus on the hardware and real time operating systems used for the embedded systems design.*

Module I (14 hrs)

Embedded systems: Overview, Design challenges-Optimising design metrics, Common design metrics- Processor technology-General purpose processors, Single purpose processors and Application specific processors. IC technology: Full-custom/VLSI, Semi-custom ASIC, Compilation/Synthesis, libraries/IP, Test/Verification, Custom Single-purpose processors: Hardware-Combinational Logic, Transistors and logic gates, Basic combinational and Sequential logic design, Custom single purpose processor design and optimisation. General-purpose processors: Software: Basic architecture, Datapath, Control unit, Memory, Instruction execution, Pipelining, Superscalar and VLIW architectures, Instruction set, Program and data memory space, Registers, I/O, Interrupts, Operating Systems, Development environment, Design flow and tools, Testing and debugging. Application-specific instruction-set processors, Microcontrollers, Digital signal processors. Standard single-purpose processors: Peripherals-some examples such as Timers, counters, Analog-digital converters, etc.

Module II (7 hrs)

Memory: Write-ability and storage permanence. Common memory types, Composing memories, memory hierarchy and cache - Cache mapping techniques: replacement, write

techniques, Cache impact on system performance, Advanced RAM, the basic DRAM, types of DRAMS, DRAM integration problem, Memory management unit (MMU)

Module III (7 hrs)

Interfacing: Basic protocol concepts, Microprocessor interfacing: I/O addressing, interrupts, DMA, Arbitration methods, Multi-level bus architectures, Advanced communication principles, Parallel, Serial and Wireless communication, Error detection and correction, Bus standards and protocols.

An example: Digital camera - User's perspective, Designer's perspective, Specification, Informal functional specification, Non-functional specification, Executable specification Design, Implementation alternatives

Module IV(13 hrs)

State machine and concurrent process models: Models vs. languages, text vs. graphics, A basic state machine model: finite-state machines, FSM with datapath model FSMD, Hierarchical/Concurrent state machine model (HCFSM) and the State charts language, Program-state machine model (PSM),The role of an appropriate model and language

Concurrent process model: Concurrent processes, create, terminate suspend, resume and join, Interprocss Communication and synchronization methods and their implementation Case studies : Windows CE, QNX

Module V (11 hrs)

Design technology: Automation-The parallel evolution of compilation and synthesis, Synthesis levels, Logic synthesis, Two-level and, Multi-level logic minimization, FSM synthesis, Technology mapping, Integration logic synthesis and physical design, Register-transfer synthesis, Behavioural synthesis, System synthesis and hardware/software codesign, Intellectual property cores, New challenges posed by cores to processor providers and users.

Text Books

1. Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware/Software Introduction, Wiley, 2002.

Reference Books

1. Jack Ganssle, The Art of Designing Embedded Systems, 2nd ed., Elsevier, 2008.
2. Raj Kamal, Embedded systems - architecture, programming and design, Tata McGraw Hill, 2007.
3. Steve Heath, Embedded Systems Design, 2nd ed., Elsevier, 2006.
4. Tammy Noergaard, Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, Elsevier, 2008.
5. A.N.Sloss, D. Symes, and C. Wright, ARM System Developer’s Guide: Designing and Optimizing System Software, Morgan Kaufmann Publishers/Elsevier, 2008.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 504 A **ELECTRONIC COMMERCE**

Module I (14 hrs)

Web commerce concepts, electronic commerce environment, electronic marketplace technologies. Web based tools for e-commerce, web server hardware and software, web server tools. E-commerce software, hosting services and packages. Modes of e-commerce, EDI, commerce with WWW/ Internet.

Module II (12 hrs)

Security issues, threats to e-commerce, Approaches to safe e-commerce, secure transactions and protocols, intruder approaches, security strategies and tools, encryption, security teams, protecting e-commerce assets, protecting client machines, servers and channels, transaction integrity.

Module III (12 hrs)

Electronic Payment Systems, types of e-payment, Internet monetary payment and security requirements, payment and purchase order process, electronic cash, electronic wallets, smart cards, credit and charge cards, risks, design of e-payment systems.

Module IV (7 hrs)

Strategies for marketing, creating web presence, identifying and reaching customers, web branding, sales on the web. Strategies for purchasing and support activities, EDI, supply chain management, softwares for purchasing.

Module V (7 hrs)

Strategies for web auctions, virtual communities and web portals. International, legal, ethical and tax issues. Planning and managing e-commerce projects.

Text Books:

1. R.Kalakota and A.B Whinston, "Frontiers of Electronic Commerce", Addison-Wesley, New Delhi, 1996.
2. G.P. Schneider and J.T. Perry, Electronic Commerce, Course Technology, Cambridge, 2000.

References

1. D. Minoli and E. Minoli, "Web Commerce Technology Handbook", Tata McGrawHill, New Delhi, 1998 .
2. W. Stallings, "Cryptography and Network Security Principles and practice", 2/e, Pearson Education Asia, 1999
3. G.W.Treese and L.C.Stewart, "Designing Systems for Internet Commerce", Addison Wesley, New Delhi, 1998.

Sessional work assessment

Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 504 B **COMPUTER ARCHITECTURE**

Objectives

- *To teach ideas on parallel computing based computer architectures with a quantitative approach.*
- *To impart concepts in new design paradigms to achieve parallelism, memory hierarchy design and inter-connection networks.*

Module I: (7 hrs)
Fundamentals: Task of a computer designer, trends in technology, usage and cost, performance measurement, quantitative principles of computer design. *Instruction set architectures*: classification, addressing and operations, encoding an instruction set, role of compilers.

Module II: (8 hrs)

Case study: the DLX architecture. *Pipelining*: Pipeline for DLX, pipeline hazards, data and control hazards, implementation difficulties, pipelining with multicycle operations.

Module III: (12 hrs)
Instruction level parallelism: concepts and challenges, dynamic scheduling, dynamic hardware prediction, multiple issue of instructions, compiler and hardware support for ILP. *Vector processing*: vector architecture, vector length and stride, compiler vectorization, enhancing vector performance.

Module IV: (13 hrs)
Memory hierarchy design: reducing cache misses and miss penalty, reducing hit time, main memory, virtual memory and its protection, *Case study*: protection in the Intel Pentium, crosscutting issues. *I/O systems*: performance measures, reliability and availability, designing an I/O system, Case study: Unix file system performance.

Module V: (12 hrs)
Interconnection networks: simple networks, connecting more than two computers, practical issues. *Multiprocessors*: introduction, application domains, centralised-shared memory and distributed-shared memory architectures, synchronisation, models of memory consistency.

Text Book

J. L. Hennesy and D. A. Pattersen, *Computer Architecture: A Quantitative approach*, 2/e, Harcourt Asia Pte Ltd (Morgan Kaufman), Singapore, 1996.

References

1. D. A. Pattersen and J. L. Hennesy, *Computer Organisation and Design: The Hardware/ Software Interface*, 2/e, Harcourt Asia Pte Ltd (Morgan Kaufman), Singapore, 1998.
2. K. Hwang, *Advanced Computer Architecture: Parallelism, Scalability and Programmability*, McGraw Hill, Singapore, 1993.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 504 C SOFT COMPUTING TECHNIQUES

Module I (12 Hrs)

Introduction to soft computing-Artificial intelligence systems– Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks: Biological neural networks, model of an artificial neuron, Activation functions, architectures, characteristics-learning methods, brief history of ANN research-Early ANNarchitectures (basics only)-McCulloch & Pitts model, Perceptron, ADALINE, MADALINE

Module II (14 Hrs)

Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, hiddenlayer, output layer computations, calculation of error, training of ANN, BP algorithm, momentum and learningrate, Selection of various parameters in BP networks. Variations in standard BP algorithms- Adaptive learning rate BP, resilient BP, Levenberg-Marquardt, and conjugate gradient BP algorithms (basic principle only)-
Applications of ANN

Module III (13 Hrs)

Fuzzy Logic–Crisp & fuzzy sets – fuzzy relations – fuzzy conditional statements – fuzzy rules – fuzzy algorithm. Fuzzy logic controller – fuzzification interface – knowledge base – decision making logic – defuzzification interface – design of fuzzy logic controller –case studies.

Module IV (8 Hrs)

Genetic algorithms – basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Elitism. Inheritance operators, Crossover-different types, Mutation, Bit-wise operators, Generational cycle, Convergence of GA, Applications of GA – case studies.

Module V (4 Hrs)

Introduction to genetic programming- basic concepts. Program representation in GP, The GP process

Text Book

1. R. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms:
Synthesis and Applications, Prentice Hall of India, New Delhi, 2003
2 .L. Fausett, Fundamentals of Neural Networks, Prentice Hall, Upper Saddle River, N.J, 1994.

Reference Books

1. D. E. Goldberg, Genetic Algorithms in Search, Optimisation, and Machine Learning, Addison-Wesley, Reading, MA, 1989
2. M. T. Hagan, H. B. Demuth, and M. H. Beale, Neural Network Design, PWS Publishing, Boston, MA, 1996

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern
Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 505 A Data Mining and Warehousing

Objectives

- *To give only a broad, yet in-depth overview of the field of data mining and warehousing, a multi-disciplinary field of study.*

Module I (10 hrs)
Introduction: what is Data Mining, which data, what kinds of patterns can be mined-Data Warehouse and OLAP technology for Data Mining,Data Warehouse Architecture.
Data preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept - hierarchy generation.

Module II (10 hrs)

Data Mining Primitives, Languages and System Architectures. - Concept Descriptions: Characteristic and Discriminant rules.
Data Generalization. - Mining Association Rules in Large Databases - Transactional databases.

Module III (10 hrs)

Concept Descriptions: Characteristic and Discriminant rules, Data Generalization, Example of decision tables and Rough Sets.
Classification and prediction, Decision Tree Induction (ID3, C4.5), Bayesian Classification.
Cluster Analysis. A Categorization of major Clustering methods

Module IV (9 hrs)

Introduction to Data warehousing: Need for warehousing, Data warehouse Architecture and design, Hardware and operational design, Tuning and testing.
Trends , Developments and Applications.

Text Books

1. J. Han and M. Kamber, *Data mining: Concepts and Techniques*, Elsevier Science, 2007.

Reference Books

1. K.P.Soman, Shyam Diwakar, and V. Ajay, *Insight into Data Mining: Theory and Practice*, Prentice Hall of India, 2006.
2. S. Sumathi, S. N. Sivanandam, *Introduction to data mining and its applications,(Illustrated Edn)*, Springer Publishers, 2006
3. P.M.Tan, N.Stenbach and V.Kumar, *Introduction to Data Mining*, Pearson Education, London, 2007
4. K.Mehmed, *Data Mining: Concepts,Models, Methods, and Algorithms*, John Wiley and Sons, 2003.
5. Paulraj Ponniah, *Data Warehousing Fundamentals: A Comprehensive Guide for IT Professional*, Wiley Student Edition, 2007
6. S. Anahary and D. Murray, *Data Warehousing in the Real World,:A Practical Guide for Building Decision Support Systems*, Pearson Education, 2000.
7. M.H. Dunham, *Data mining: Introductory and Advanced Topics*, Pearson Education, 2004.

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 505 B PATTERN RECOGNITION

Objectives

- To understand different pattern recognition methods which can be adopted in web access and image processing.

Module I: (12 hrs)

Introduction- Introduction to statistical, syntactic and descriptive approaches, features and feature extraction, learning.Bayes Decision theory- introduction, continuous case, 2-category classification, minimum error rate classification, classifiers, discriminant functions, and decision surfaces. Error probabilities and integrals, normal density, discriminant functions for normal density.

Module II: (8 hrs)

Parameter estimation and supervised learning- Maximum likelihood estimation, the Bayes classifier, learning the mean of a normal density, general bayesian learning.

Module III: (8hrs)

Nonparametric technic- density estimation, parzen windows, k-nearest Neighbour estimation, estimation of posterior probabilities, nearest- neighbour rule, k-nearest neighbour rule.

Module IV: (10 hrs)

Linear discriminant functions- linear discriminant functions and decision surfaces, generalised linear discriminant functions, 2-category linearly separable case, non-separable behaviour, linear programming procedures.

Clustering- Data description and clustering, similarity measures, criterion functions for clustering.

Module V: (14 hrs)

Syntactic approach to PR- Introduction to pattern grammars and languages, higher dimensional grammars- tree, graph, web, plex, and shape grammars. Stochastic grammars, attribute grammars. Parsing techniques, grammatical inference.

Text Books

1.Duda and Hart P.E, Pattern classification and scene analysis, John Wiley and Sons, NY, 1973. 2. Gonzalez R.C. and Thomson M.G., Syntactic Pattern Recognition – an Introduction, Addison wesley, 1997

Reference

Fu K.S., Syntactic Pattern recognition and applications, Prentice Hall, Eaglewood cliffs, N.J., 1982.

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

MCA10 505 C DISTRIBUTED COMPUTING

Objectives

- To give concepts of distributed systems, algorithms and distribution models.

Module I (10 hs)

Distributed systems versus Parallel systems, Models of distributed systems**,** Happened Before and Potential Causality Model, Models based on States.

Module II (10 hs)

Logical clocks, Vector clocks, Verifying clock algorithms, Direct dependency clocks, Mutual exclusion, Lamport's algorithm, Ricart Agrawala algorithm.

Module III (10 hrs)

Mutual exclusion algorithms using tokens and Quorums, Drinking philosophers problem, Din-ing philosophers problem under heavy and light load conditions. Leader election algorithms. Chang-Roberts algorithm.

Module IV (12 hrs)

Global state detection, Global snapshot algorithm, Termination detection- Dijikstra and Scholten's algorithm, Causal message ordering algorithms, Self stabilization , Mutual exclusion with K-state machines.

References:

1. Vijay K. Garg., Elements of Distributed Computing, Wiley & Sons, 2002
2. Chow R. & Johnson T., *Distributed Operating Systems and Algorithms*, Addison Wesley, 2002
3. Tanenbaum S., *Distributed Operating Systems*, Pearson Education.,2005
4. Coulouris G., Dollimore J. & Kindberg T., *Distributed Systems Concepts And Design*, 2/e, Addison Wesley 2004

Sessional work assessment	
Assignments	2x10 = 20
Tests	2x15 = 30
Total marks	= 50

University examination pattern

Seven questions covering all the five modules .Each carries 20 marks and each question should have minimum of two parts. There should be a minimum of one question from each module. There should not be more than 2 questions from any module. The student has to answer any five full questions for scoring full marks.

THESIS WORK

The student is expected to work on a chosen topic, under the guidance of a supervisor approved by the department, at least for a period of four full months, as per the rules and regulations of the Calicut University. 5 copies of the thesis have to be submitted, out of which three copies will be forwarded to the university. While one of the copies is for the guide, the other copy will be sent to the Library of the department.

University Examination

The thesis will be evaluated by the university by a panel consisting of the internal examiner and an external examiner who are appointed by the university. The candidate will be examined by a viva-voce examination and the thesis will be graded .