ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES

RAJAMPET - 516126

(AUTONOMOUS)

www.aitsrajampet.ac.in

DEPARTMENT OF COMPUTER APPLICATIONS

COURSE STRUCTURE & SYLLABI

(For the batches admitted from the academic year 2015-16)

MASTER OF COMPUTER APPLICATIONS

DEPARTMENT OF COMPUTER APPLICATIONS

VISION

To become globally prominent and significant in the areas of academics and research keeping the aim of developing competitive professionals to serve the society and to light on the needs of ever changing software industry.

MISSION

- ❖ To enable the students to be knowledgeable and creative by developing state-of-the-art innovative teaching methodologies.

- ❖ Providing training programs that bridges the gap between academia and industry to produce competitive software professionals.

- ❖ To inculcate values and ethics in the students enabling them to become socially committed professionals.

- ❖ To enhance the research quality and productivity, by providing required facilities and industry collaboration.

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ACADEMIC REGULATIONS
Applicable for students admitted into
MASTER OF COMPUTER APPLICATIONS Programme from 2015-16

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The Jawaharlal Nehru Technological University Anantapur, Anantapuram shall confer Master of Computer Applications (M.C.A) Degree to candidates who are admitted to the M.C.A program and fulfill all the requirements for the award of the degree.

1. ELIGIBILITY FOR ADMISSION:

Admission to the MCA Degree programme shall be made subject to the eligibility, qualification prescribed by the competent authority from time to time.
Admissions shall be made on the basis of rank obtained by the qualifying candidates at the entrance test, subject to reservations or policies framed by the Government of Andhra Pradesh from time to time.

2. ADMISSION PROCEDURE:
Admissions as per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year as follows:
   (a) A - Category Seats are to be filled by the Convener, through ICET
   (b) B - Category Seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

3. COURSE WORK:
   3.1 A candidate after securing admission must pursue the MCA course of study for Six semesters duration
   3.2 Each semester shall be of 90 instruction days.
   3.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

4. ATTENDENCE:

   4.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance aggregate in all subjects/courses in the semester.
   4.2 Condonation of shortage of attendance up to 10% i.e., between 65% and above and less than 75% may be granted by the Institute Academic committee.
   4.3 Shortage of attendance below 65% in aggregate shall in no case be condoned.
   4.4 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
   4.5 A stipulated fee shall be payable towards Condonation of shortage of attendance to the institute as per following slab system
   1st Slab: Less than 75% attendance but equal to or greater than 70% a normal Condonation fee can be collected from the student.
   2nd Slab: Less than 70% but equal to or greater than 65%, double the
    Condonation fee can be collected from the student.

4.6 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled for that semester.

4.7 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.

4.8 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

5. CREDIT SYSTEM NORMS:

Credit system norms given in Table -1

Table -1

Subject	Period(s)/Week	Credit(s)
Theory	01	01
Practical	03	02
Seminar	..	02
Project Work	..	12

6. EVALUATION:

6.1 Distribution of marks

S. No	Examination	Marks	Examination and Evaluation	Scheme of Evaluation
1.	Theory	60	Semester-end examination (External evaluation)	The question paper shall be of descriptive type with 5 questions with internal choice are to be answered in 3 hours duration of the examination.
		40	Mid - Examination of 120 Min. duration (Internal evaluation). 4 descriptive type questions with internal choice are to be answered and evaluated for 40 marks.	Two mid-exams 40 marks each are to be conducted. Better one to be considered. **Mid-I:** After first spell of instructions (I&II Units). **Mid-II:** After second spell of instructions (III, IV & V Units).
2	Laboratory	60	Semester-end Lab Examination (External evaluation)	**For laboratory courses:** **3** hours duration. One External and One Internal examiners.

S. No	Examination	Marks	Examination and Evaluation		Scheme of Evaluation
		40	20	Day to Day evaluation (Internal evaluation)	Performance in laboratory experiments.
			20	Internal evaluation	Practical Tests (one best out of two tests includes viva-voce)
3	Seminar in each of the semesters. 2 hours /week	100	Internal Evaluation 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers		Continuous MODE OF EVALUATION during a semester by the Departmental Committee (DC)
4	Project work	Very Good (>90%) Good (80%) Not Satisfactory (<60%)	12 credits	External evaluation	End Project Viva-Voce Examination by Committee as detailed under section 8.7
			4 credits	Internal evaluation	Continuous MODE OF EVALUATION by the DC.

6.2 A candidate shall be deemed to have secured the minimum academic requirement in a subject/practical if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal MODE OF EVALUATION taken together.

6.3 A candidate has to secure a minimum of 50% to be declared successful.

6.4 In case the candidate does not secure the minimum academic requirement in any of the subjects/practical, he has to reappear for the Examination either supplementary or regular in that subject/practical along with the next batch students. A separate supplementary examinations will be conducted for the I semester students at the end of II semester.

6.5 **RMODE OF EVALUATION / Recounting:** Students shall be permitted to request for recounting/ rMODE OF EVALUATION of the end theory examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a letter or a notice.

7. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL MODE OF EVALUATION MARKS FOR THEORY SUBJECTS

7.1 The candidate should have completed the course work for all five semesters pending project work submission.

7.2 Out of the subjects the candidate has failed in the examination due to internal MODE OF EVALUATION marks secured being less than 50%, the candidate shall be given one chance for each theory subject and for a maximum of three theory subjects for improvement of internal MODE OF EVALUATION marks.

7.3 The candidate has to re-register for the chosen subjects and fulfill the academic requirements. Re-registration shall not be permitted after the commencement of class work for that semester.

7.4 For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee.

7.5 In the event of availing the improvement of internal MODE OF EVALUATION marks, the internal MODE OF EVALUATION marks as well as end examination marks secured in the previous attempt(s) for the re-registered subjects stand cancelled.

8. MODE OF EVALUATION OF PROJECT WORK

8.1 Registration of Project work : A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I to V Semester)

8.2 A Departmental Committee (D.C) consisting of HOD, Supervisor and one internal senior faculty shall monitor the progress of the project work.

8.3 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The candidate can submit Project thesis with the approval of D.C. at the end of the VI semester instruction as per the schedule. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

8.4 The student must submit status report at least in two different phases during the project work period. These reports must be approved by the D.C before submission of the Project Work.

8.5 The viva-voce examination may be conducted for all the candidates as per the VI semester examination schedule.

8.6 Three copies of the Thesis / Dissertation are to be certified in the prescribed by the supervisor and HOD. The copies are to be submitted to the Head of the Department.

8.7 For carrying out project work, the students will be permitted to submit final report, only after securing grade of 'Very Good' or 'Good' in the internal evaluation. The student securing a grade of 'Not Satisfactory' will have to re-appear and face Internal MODE OF EVALUATION Committee (IEC) and secure 'Good' or 'Very Good'. Then he /she will be permitted to submit the project report. The internal project MODE OF EVALUATION committee consisting of HOD, Supervisor and two other senior faculty members in the department. External viva voce examination shall be awarded 'Very Good', or 'Good' or 'Not Satisfactory' by a Board consisting of supervisor, HOD and an External Examiner.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

9.1 For a semester/year

CREDIT POINT AVERAGE [CPA] $= \dfrac{1}{10} \dfrac{\sum_i c_i T_i}{\sum_i c_i}$

Where C_i = Credits earned for Course i in any semester/ year,

T_i = Total marks obtained for course i in any semester/year,

9.2 For the entire programme

CUMULATIVE CREDIT POINT AVERAGE [CCPA] $= \dfrac{1}{10} \dfrac{\sum_n \sum_i c_{ni} T_{ni}}{\sum_n \sum_i c_{ni}}$

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

9.3 Overall Performance

CCPA	Classification of Final Result
7.0 and above	First Class with Distinction
6.0 and above but below 7.0	First Class
5.0 and above but below 6.0	Second Class

10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript consisting performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

11. ELIGIBILITY:

A student shall be eligible for the award of M.C.A Degree, if he fulfills all the following conditions:

(i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.

(ii) Successfully acquired all the **164 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.

(ii) No disciplinary action is pending against him.

12. AWARD OF DEGREE:

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapur on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences (Autonomous)

13. AMENDMENTS TO REGULATIONS:

The Chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

MCA graduates will be able to:

PEO1: Practice software engineering principles and standards to develop software to meet customer requirements across verticals

PEO2: Contribute to build sustainable and inclusive applications using mathematical, simulation and meta-heuristic models

PEO3: Demonstrate entrepreneurial qualities through individual competence and team work

PEO4: Achieve successful professional career with integrity and societal commitments leading to lifelong learning

PROGRAM OUTCOMES (PO)

MCA graduates will be able to:

PO1: Computational Knowledge: Acquire in-depth computational knowledge and mathematics with an ability to abstract and conceptualize models from defined problems and requirements

PO2: Problem Analysis: Identify, formulate, conduct literature survey and solve complex computing problems through analysis as well as provide optimal solutions

PO3:   **Design / Development of Solutions:** Design and evaluate solutions for complex problems, components or processes that meet specified needs after considering public health and safety, cultural, societal, and environmental factors

PO4:   **Conduct investigations of complex Computing problems:** Conduct literature survey to analyze and extract information relevant to unfamiliar problems and synthesize information to provide valid conclusions and interpret data by applying appropriate research methods, tools and design experiments

PO5:   **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources and modern IT tools to complex computing system activities, with an understanding of the limitations

PO6:   **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices

PO7:   **Life-long Learning:** Engage in lifelong learning independently for continual development to improve knowledge and competence as a computing professional

PO8:   **Project management and finance:** Demonstrate knowledge and understanding of management principles and apply these to multidisciplinary software development as a team member and manage projects efficiently as a leader considering economical and financial factors

PO9:   **Communication Efficacy:** Understand and communicate effectively with the computing community and with society at large, regarding complex computing systems activities confidently and effectively by writing effective reports and design documentations by adhering to appropriate standards, make effective presentations and give / receive clear instructions

PO10: **Societal and Environmental Concern:** Understand responsibilities and consequences based on societal, environmental, health, safety, legal and cultural issues within local and global contexts relevant to professional computing practices

PO11: **Individual and Team Work:** Function effectively as an individual, as a member or leader in diverse teams in multidisciplinary environments

PO12: **Innovation and Entrepreneurship:** Identify a timely opportunity for entrepreneurship and use innovation to pursue and create value addition for the betterment of the individual and society at large

PROGRAM SPECIFIC OUTCOMES (PSO)

MCA graduates will be able to:

PSO1: Solve real world computing system problems of various industries by understanding and applying the principles of mathematics, computing techniques and business concepts

PSO2: Design, test, develop and maintain desktop, web, mobile and cross platform software applications using modern tools and technologies

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

MCA COURSE STRUCTURE

Curriculum for the Programme under Autonomous Scheme	
Regulation	AITS-R15
Department	Department of Computer Applications
Programme Code & Name	P2, MCA

First Semester MCA

Subject Code	Name of the Subject	Hrs. Per week		C	Maximum Marks		
		L	P		Internal	External	Total
5P2B11	Mathematical Foundations of Computer Science	4	0	4	40	60	100
5P2B12	Computer Programming	4	0	4	40	60	100
5P2C13	Probability and Statistics	4	0	4	40	60	100
5P2A14	Accounting and Financial Management	4	0	4	40	60	100
5P2B15	Information & Communication Technology	4	0	4	40	60	100
5P2C16	Technical Communication & Computer Ethics	4	0	4	40	60	100
5P2B17	Computer Programming Lab	0	3	2	40	60	100
5P2B18	Information & Communication Technology Lab	0	3	2	40	60	100
5P2C19	English Communication Skills Lab	0	3	2	40	60	100
Total		24	9	30	360	540	900

Note: L- Lecture; P-Practical; C – Credits.

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MCA COURSE STRUCTURE

Curriculum for the Programme under Autonomous Scheme	
Regulation	AITS-R15
Department	Department of Computer Applications
Programme Code & Name	P2, MCA

Second Semester MCA

Subject Code	Name of the Subject	Hrs. Per week		C	Maximum Marks		
		L	P		Internal	External	Total
5P2B21	Computer Organization	4	0	4	40	60	100
5P2B22	Business Data Processing	4	0	4	40	60	100
5P2C23	Numerical Methods	4	0	4	40	60	100
5P2C24	Operations Research	4	0	4	40	60	100
5P2A25	Organization Structure & Personal Management	4	0	4	40	60	100
5P2B26	Data Structures	4	0	4	40	60	100
5P2B27	Assembly Language Programming Lab	0	3	2	40	60	100
5P2B28	COBOL Lab	0	3	2	40	60	100
5P2B29	Data Structures through C++ Lab	0	3	2	40	60	100
Total		24	9	30	360	540	900

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MCA COURSE STRUCTURE

Curriculum for the Programme under Autonomous Scheme	
Regulation	AITS-R15
Department	Department of Computer Applications
Programme Code & Name	P2, MCA

Third Semester MCA

Subject Code	Name of the Subject	Hrs. Per week		C	Maximum Marks		
		L	P		Internal	External	Total
5P2B31	Database Management Systems	4	0	4	40	60	100
5P2B32	Computer Communications	4	0	4	40	60	100
5P2B33	Network Programming	4	0	4	40	60	100
5P2B34	Java Programming	4	0	4	40	60	100
5P2B35	Design & Analysis of Algorithms	4	0	4	40	60	100
5P2B36	Operating Systems	4	0	4	40	60	100
5P2B37	DBMS Lab	0	3	2	40	60	100
5P2B38	Network Programming Lab	0	3	2	40	60	100
5P2B39	Java Programming Lab	0	3	2	40	60	100
Total		24	9	30	360	540	900

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MCA COURSE STRUCTURE

Curriculum for the Programme under Autonomous Scheme	
Regulation	AITS-R15
Department	Department of Computer Applications
Programme Code & Name	P2, MCA

Fourth Semester MCA

Subject Code	Name of the Subject	Hrs. Per week		C	Maximum Marks		
		L	P		Internal	External	Total
5P2B41	Software Engineering	4	0	4	40	60	100
5P2B42	System Software	4	0	4	40	60	100
5P2B43	Advanced Java for Web Technologies	4	0	4	40	60	100
5P2B44	Data ware Housing and Data Mining	4	0	4	40	60	100
	Elective I	4	0	4	40	60	100
	Elective II	4	0	4	40	60	100
5P2B47	Software Engineering Lab	0	3	2	40	60	100
5P2B48	Web Technologies Lab	0	3	2	40	60	100
5P2B49	Data Ware Housing and Data Mining Lab	0	3	2	40	60	100
Total		24	9	30	360	540	900

Elective I

5P2B4A	Cloud Computing
5P2B4B	Computer Graphics and Multimedia
5P2B4C	Software Project Management

Elective II

5P2B4D	Distributed Data bases
5P2B4E	Artificial Intelligence
5P2B4F	Management Information Systems

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MCA COURSE STRUCTURE

Curriculum for the Programme under Autonomous Scheme	
Regulation	AITS-R15
Department	Department of Computer Applications
Programme Code & Name	P2, MCA

Fifth Semester MCA

Subject Code	Name of the Subject	Hrs. Per week		C	Maximum Marks		
		L	P		Internal	External	Total
5P2B51	Research Methodology	4	0	4	40	60	100
5P2B52	.Net Technologies	4	0	4	40	60	100
5P2B53	Object Oriented Modeling and Design with UML	4	0	4	40	60	100
5P2B54	Open Source Software	4	0	4	40	60	100
	Elective III	4	0	4	40	60	100
	Elective IV	4	0	4	40	60	100
5P2B57	.Net Technologies Lab	0	3	2	40	60	100
5P2B58	UML Lab	0	3	2	40	60	100
5P2B59	Software Development Lab	0	3	2	40	60	100
Total		24	9	30	360	540	900

Elective III

5P2B5A	Big Data
5P2B5B	Soft Computing
5P2B5C	Software Architecture

Elective IV

5P2B5D	Information Security
5P2B5E	Software Testing Methodology
5P2B5F	Mobile Application Development

Sixth Semester MCA

Code	Subject	Credits
5P2B61	Project Seminar	2
5P2B62	Project Thesis / Dissertation	12

First Semester MCA

(5P2B11) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

COURSE PREREQUISITES:
- Programming Abstractions or equivalent.
- Some programming is required.

COURSE OBJECTIVE
- Fundamental concepts and tools in discreet mathematics with emphasis on their applications to computer science.
- Topics include logic and Boolean circuits; sets, functions, relations, databases, and analysis techniques based on counting methods and recurrence equations; trees and more general graphs.

EXPECTED COURSE OUTCOMES
- Demonstrate the understanding of the fundamental concepts of discrete mathematical structures.
- Apply the knowledge and skills obtained to investigate and solve a variety of mathematical foundation problems.
- Analyze mathematical concepts like sets, reasoning, relational algebra and graph theory to solve the problems and optimize the solution.
- Justify the overall mathematical knowledge gained to interpret and analyze the problems in various fields

UNIT-I

MATHEMATICAL LOGIC: Statements and Notations, Connectives: AND, OR, Conditional, Bi-conditional, Negation, Truth Tables, Tautology, Contradiction, Well-formed Formulas, Logical Equivalence, Equivalence Implication, Normal Forms, PREDICATES: Predicative Logic, Quantifiers, Universal Quantifiers, Free & Bound Variables, Rules of Inference, Consistency, Proof of Contradiction.

UNIT-II

RELATIONS:
Operations on Relations, Properties of Binary Relations, Equivalence, Compatibility and Partial Ordering Relations, Lattices and its Properties, Hasse Diagram, Transitive Closure, Representing Relations, Diagraph of POSET.

UNIT-III

ELEMENTARY COMBINATORICS :Basis of Counting, Enumerating Combinations & Permutations with Repetitions, Constrained Repetitions, Binomial Coefficients, Binomial Multinomial Theorems, The principles of Inclusion – Exclusion. Pigeon hole Principles and its Application.

UNIT-IV

RECURRENCE RELATION: Generating Functions & Sequences, Calculating Coefficient of Generating Function, Homogeneous Recurrence Relations: First Order, Second Order, Third and Higher Order Recurrence Relations, Inhomogeneous Recurrence Relation: First Order, Second and Higher Order.

UNIT-V

GRAPH THEORY APPLICATIONS: Representation of Graphs with Examples, Vertex, Degree, Sub Graph, Multi Graph, Simple Graph, Complete Graph, Bipartite Graph, Regular Graph, Digraph, Operations on Graphs, Euler Circuits, Hamiltonian Graphs, Chromatic Number, Planar Graphs, Trees, Spanning Trees: DFS, BFS, Minimal Spanning Trees: Prim's and Kruskal's Algorithms.

TEXT BOOKS:
1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, J.L.Mott, A. Kandel, T.P. Baker, PHI
2. Mathematical Foundations of Computer Science, D. Chandra Sekharaiah, Prism Books.

REFERENCE BOOKS:
1. Discrete Mathematical Structures with Application to Computer Science, Tremblay, Monohar. McGraw Hill Publication.
2. Elements of Discrete Mathematics – A computer oriented approach, C.L.Liu, D.P. Mahopatra, Third Edition, TMH.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	1	-	1	-	-	-	-	-
CO2	3	2	1	2	-	-	1	-	-	-	-	-
CO3	3	2	1	3	-	-	1	-	-	-	-	-
CO4	3	3	1	3	1	-	1	-	-	-	-	-

 Correlation Levels 1,2 or 3 as defined below:
 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

First Semester MCA

(5P2B12) COMPUTER PROGRAMMING

COURSE PREREQUISITES

There are no **prerequisites** to learn **C programming**. In fact **C** is considered as a **language** to start with for beginners.

COURSE OBJECTIVE

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.

EXPECTED COURSE OUTCOMES:

- To understand the basic terminology used in computer programming.
- To write, compile and debug programs in C and C++ language.
- To use different data types in a computer program.
- Design programs involving decision structures, loops and functions.

UNIT-I

INTRODUCTION TO PROGRAMMING AND C LANGUAGE: History of Programming Languages, Programming Language Paradigms, Programming Language Qualities, Algorithm, Flowchart, Pseudo Code, C Character Set, Delimiters, Keywords, Constants, Identifiers and Variables, Data Types, Anatomy of a C Program, Expressions, Precedence and Associativity of Operators, Type Casting, Formatted and Unformatted I/O Statements, Storage Classes and Control Statements Arrays and Strings: Array Concept, Types of Array: One Dimensional and Multi-Dimensional Array, Introduction to String, String Representation and Initialization, Array of Strings and String Manipulation Functions.

UNIT-II

FUNCTIONS: Introduction to Function, System Defined and User Defined Function, Local and Global Variables, Parameter Passing Mechanism: Pass by Value and Pass by Reference, Scope, Recursion: Recursive Function, Pointers: Dynamic Memory Management of 'C', Declaration and Initialization of Pointers, Structures: Introduction to Structure and Union, Structure Declaration and Initialization, Nested Structure, Files: Types of File: Binary and Text File, Operations on File: Open, Close, Read, Write and Seek, Programs to Implement File, Command Line Argument and its Usage.

UNIT III

C++ BASICS: Data Abstraction, Class Specification, Class Objects, Accessing Class Members, Inline Functions, Access Control Specifiers, Friend Functions and Friend Classes, Constant Member Functions, Static Data and Member Functions, Structure of a C++ Program.

Constructors and Destructors, Copy Constructor, Static Data Members with Constructors and Destructors, Nested Classes, New and Delete Operators, Dynamic Creation and Destruction of Objects.

UNIT IV

Function Overloading, Operator Overloading, Function Templates and Class Templates, Need for Virtual Functions, Definition of Virtual Functions, Pure Virtual Functions, Virtual Destructors, Dynamic Binding through Virtual Functions, Abstract Classes. Inheritance, Forms of Inheritance, Defining the Base and Derived Classes, Inheritance and Member Accessibility, Object Composition, Delegation.

UNIT V

C++ Stream Classes Hierarchy, File Streams and Console Streams, Manipulators, Overloading Operators <<and>>, File Operations, Error Handling during File Manipulation. Exception Handling Model of C++, Exception Handling Constructs, Handling Uncaught Exceptions, Benefits of Exception Handling, Rules for Handling Exceptions

TEXT BOOKS
1. Programming Language Concepts, 3rd Edition- Ghezzi, Mehdi, Jazayeri, John Wiley & Sons.
2. Mastering C+ +, K.R. Venugopal, Rajkumar & T. Ravi Shankar, Tata Mcgraw Hill.
3. Programming in C and Data Structures, J.R. Hanly, Ashok N. Kamthane, A. Ananda Rao, Pearson Education.

REFERENCE BOOKS
1. Programming with ANSI and Turbo C – Ashok N. Kamthane, Pearson Education.
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.
3. Object Oriented Programming in C++, 4th Edition, R.Lafore, SAMS, Pearson Education.
4. Learning C++ a hands-on approach-Eric Nagler, Jaico Publishing House.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	1	1	-	-	1	1	-	3	-
CO2	-	-	-	-	-	-	3	2	-	-	1	-
CO3	3	1	-	-	-	1	-	3	-	1	-	-
CO4	3	2	-	3	-	-	2	3	-	-	-	-

- Correlation Level 1,2 or 3 as defined below:
- 1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High), If there is no correlation, put " –"

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First Semester MCA

(5P2C13) PROBABILITY AND STATISTICS

COURSE PREREQUISITES: Differential and Difference Equations

COURSE OBJECTIVE
This course provides a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world. Topics include: probability distributions, exploratory data analysis via various descriptive statistics, inferential statistical methods such as the various forms of the t-test, use of confidence intervals, sample size and ANOVA.

EXPECTED COURSE OUTCOMES
- Apply probability theory via Bayes' Rule
- Describe the properties of discrete and continuous distribution functions
- Assess the sampling distribution, efficiency and biasedness of estimators Use statistical tests in testing hypotheses on data
- Analyze goodness of fit, ANOVA for one-way and two-way classification data

UNIT-I

Probability: Sample Space and Events – Probability – The Axioms of Probability – Some Elementary Theorems - Conditional Probability – Baye's Theorem. Random Variables – Discrete and Continuous – Distribution Functions - Mean and Variance.

UNIT-II

Binomial Distribution –Poison Distribution- Uniform Distribution - Normal Distribution.

UNIT-III

Sampling Distribution: Population and Sample - Sampling Distributions of Means (σ known and unknown). Estimation: Point Estimation – Interval Estimation - One Mean –Two Means (large sample) and One Proportion – Two Proportions (large sample).

UNIT-IV

Test of Hypothesis – Large Samples: Hypothesis Concerning One and Two Means. Test of Proportions (one and two).Small Samples: t- test, F-test.

UNIT-V

$\chi 2$– Tests –goodness of fit, ANOVA for one- way and two-way classification data

TEXT BOOKS:
Probability and Statistics for Engineers (Miller& Freund's), Richard A Johnson, 7th Edition, PHI

REFERENCEBOOKS:

1. Probability and Statistics for MCA, T.K.V.Iyengar, B.krishna Gandhi, S.Ranganathan, M.V.S.S.N.Prasad, S.Chand and Company Ltd.
2. Probability and Statistics, B. V. Ramana, Tata McGraw Hill.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	1	-	-	1	1	-	3	-
CO2	1	-	2	-	2	-	3	2	-	-	1	-
CO3	3	1	-	-	3	1	-	3	-	3	-	-
CO4	3	2	2	3	-	-	2	3	-	2	-	-

Correlation Levels 1,2 or 3 as defined below:
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First Semester MCA
(5P2A14) ACCOUNTING AND FINANCIAL MANAGEMENT

COURSE PREREQUISITES: Basic principles of accounts

COURSE OBJECTIVE
The aim of this course is to understand how business use accounting and financial information for decision-making purpose.

EXPECTED COURSE OUTCOMES:
CO 1: An ability to understand the basic concepts in accounting financial management and Identifying the appropriate managerial and business issues critical to analyzing accounting data and other information used for identifying and assessing opportunities and risks, developing organizational plans, allocating resources, and accomplishing objectives
CO2: Demonstrate an understanding of the difference between accounting and financial management as well as the relationship between the two
CO3: Demonstrate an understanding of cost behavior and analysis including the associated calculations break even analysis or Cost Volume Profit analysis.
CO4: Apply finance concepts and techniques within the larger organizational decision-making context.

UNIT I

INTRODUCTION TO ACCOUNTING: Principles, Concepts and Conventions, Basics of accounts, Double entry system of accounting, Classification of accounts and debit-credit rules. Introduction to basic books of accounts, Journal and Ledger – Trial balance – Preparation of final accounts: Trading account, Profit and Loss account and Balance sheet with adjustments (with simple illustrations)

UNIT II

BREAK EVEN ANALYSIS - Introduction, Definition, meaning and BEP analysis and BEP in units. Concept of Break Even Point, Cost-Volume-Profit Analysis, Determination of Break Even Point, Margin of Safety and P/V ratio, Practical applications of Break Even Analysis, Simple problems.

UNIT III

FINANCIAL ANALYSIS THROUGH RATIOS: Ratio Analysis meaning –advantages and disadvantages, Classification of ratios – Analysis and interpretation of   financial statements through ratios of liquidity, Solvency and Profitability.

UNIT IV

INTRODUCTION TO FINANCIAL MANAGEMENT: Time value of money-Present Value of Money-Future Value of Money. Financial management Definition-scope, Objectives of financial management, Sources of finance.

UNIT V

CAPITAL BUDGETING: Features, Proposals, Methods of capital budgeting, Payback method, Accounting rate of return (ARR), Net Present Value Method (NPV) and Internal Rate of Return (IRR) -Simple problems.

TEXT BOOKS
1. Financial Accounting: S.N.Maheshwari, Sultan Chand, 2009.
2. Management Accounting: Theory and Practice, Pandikumar M.P 1st edition, Excel Books, 2007.
3. Financial Management and Policy, Van Horne, James.C. Pearson, 2009.
4. Management Accounting, Khan My, Jain P.K, 4th Edition, Tata McGraw Hill, 2007.
5. Financial Accounting, Tulsian, S Chand, 2009.
6. Financial Statement Analysis, Khan and Jain, PHI, 2009
7. Financial Management, I.M.Pandey, Vikas Publications.
8. Financial Management, Prasanna Chandra, T.M.H, 2009.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	1	1	-	-	1	1	-	3	-
CO2	-	-	-	-	-	-	3	2	-	-	1	-
CO3	3	1	-	-	-	1	-	3	-	1	-	-
CO4	3	2	-	3	-	-	2	3	-	-	-	-

Correlation Levels 1,2 or 3 as defined below:
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First Semester MCA

(5P2B15) INFORMATION & COMMUNICATION TECHNOLOGY

COURSE PREREQUISITES

Student must have some knowledge in Different types of information and communication systems

COURSE OBJECTIVE

1. To know the role and position of information Technology and Communication in real world
2. to develop knowledge, skills and attitudes necessary to apply ICT knowledge

EXPECTED COURSE OUTCOMES

1. Develop an understanding of ICT and apply their knowledge and skills to solve real-life problems.
2. In order to fulfill the purpose of Computer and Information Technology to build a firm foundation and focuses more on the basic knowledge and transferable skills
3. To prepare students to become effective users of ICT so as to support their life-long learning, as well as to provide a pathway into the workforce

UNIT I

BASIC STRUCTURE OF COMPUTERS: Computer types, Functional Units, Basic Operational concepts, Bus structure, Software, Performance, Multiprocessors and Multicomputer and Historical Perspective, Generation of Programming Languages – Machine Languages, Assembly Language, High-level Programming, Fourth Generation Languages, Fifth Generation Languages.

UNIT II

SEMICONDUCTOR MEMORIES: SRAM, DRAM, SDRAM, ROM, PROM, EEPROM, Flash Memory and Cache Memory, SECONDARY STORAGE DEVICES: Magnetic Hard Disks, Optical System and Magnetic tape systems.

UNIT III

DISCRETE COMPONENTS OF COMPUTER: Mother Board, Cabinet, Memory, Processor and Peripherals, Configuring a Computer System COMPUTER PERIPHERALS: Input Devices, Output Devices, Serial Communication Links and Standard I/O Interfaces: PCI, SCSI and USB.

UNIT IV
COMPUTER NETWORKS: History of Networks, Types of Networks: LAN, MAN, WAN, Intranet, Internet, Extranet, Network Topologies.
Network Components: Transmission Media, NIC Hubs, Switches, Bridges, Routers, Gateways, Modems.

UNIT V
Introduction to OSI Reference Model, Introduction to TCP/IP: Layers, IP, ARP, RARP, ICMP, TCP, UDP, DNS, Email, FTP, TFTP, WWW, HTTP and Telnet
WEB TECHNOLOGY: Dynamic Web Pages, Active Web pages and XML

TEXT BOOKS
1. Carl Hamacher, Zvonko Vranesic and Safat Zaky, Computer Organization, 5/e. Mc Graw-Hill International Edition 2002.
2. Achut S Godbole and Atula Kahate, Web Technologies: TCP/IP to Internet Applications Architectures, Tata McGraw-hill, 2003.
3. Peter Norton, Introduction to Computers, 6/e, Tata McGraw Hill, 2006.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	1	-	1	-	-	-	-	-
CO2	3	2	1	2	-	-	1	-	-	-	1	-
CO3	3	2	1	3	-	-	1	-	-	2	-	-

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First Semester MCA

(5P2C16) TECHNICAL COMMUNICATION & COMPUTER ETHICS

COURSE PREREQUISITES: Fundamentals of English grammar

COURSE OBJECTIVE
1. To develop and to create awareness regarding communication in organization.
2. To know various key issues and strategies in developing soft wares.
3. To learn team working and to attempt interviews successfully.
4. To explore moral responsibilities and ethical decision – making in IT sector.

EXPECTED COURSE OUTCOMES
1. Able to understand importance of communication and to practice different communication skills in organizational level by overcoming barriers.
2. Able to apply technology in communication and to practice different non-verbal communication skills.
3. Able to attend interviews, meetings and conferences with confidence
4. Able to follow ethics in business and professional life.
5. Able to study various issues and strategies of software development.

UNIT I

Basics of Technical Communication -Introduction, Process of Communication, Language as a Tool, Levels of Communication, Communication Networks, Importance of Technical Communication.
Active Listening: Introduction, Types of Listening, Traits of good Listener, Active versus passive listening, implications of effective listening; **Barriers to Communication:** Definition of Noise, Classification of Barriers.

UNIT II

Technology in Communication: Impact of Technology, Software for Creating Messages, Software for Writing Documents, Software for Presenting Documents, Transmitting Documents, Effective use of Available Technology
The Importance of Non-Verbal Communication: Kinesics, Proxemics, Paralinguistic, and Chromatics
Effective Presentation Strategies: Introduction, Defining purpose, Analyzing Audience and Locale, Organizing Contents, preparing outline, Usage of Visual Aids, Understanding Nuances of Delivery

UNIT III

Group Communication: Introduction, Group Discussion, Organizational Group discussion. Group discussion as part of selection process Meetings, conferences
Interviews: Introduction, Objectives, Types of Interviews, Job Interviews. **Resume Writing:** Format and Style, Sample Resumes

UNIT IV
Overview of Ethics: What are Ethics? Ethics in the Business World, Ethics in Information Technology (IT)
Ethics for IT Professionals and IT users: IT professionals, The Ethical behavior of IT professionals, IT Users

UNIT V

Privacy: Privacy Protection and the Law, Key Privacy and Anonymity Issues
Software Development: Strategies to Engineer Quality s/w, Key Issues, Case study.
Employer/Employee Issues Use of Non-traditional workers, Whistle Blowing

TEXT BOOKS
1. **Technical Communication, Principles and Practices,** Meenakshi Raman and Sangeeta Sharma, Oxford University Press, 2004
2. **Ethics in Information Technology,** George Reynolds, Thomson Course Technology, 2003

REFERENCE BOOKS:
- Effective Technical Communication, M Ashraf Rizvi, TMGH Publications
- Ethics in Engineering, Mike W Martin and Ronal Schinzinger, 3rd edition, Tata McGraw Hill, 2003

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	-	2	-	1	-
CO2	-	-	-	-	3	-	2	-	1	-	-	-
CO3	-	-	-	-	-	-	1	-	2	-	3	-
CO4	-	-	-	-	-	3	1	-	-	-	2	-
CO5	-	-	-	-	3	-	2	-	1	-	-	-

Correlation Levels 1,2 or 3 as defined below:
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First Semester MCA

(5P2B17) COMPUTER PROGRAMMING LAB

1. C program that implement the expression, typecasting statements in the presence of decision statements and loop statements.
2. C program that implement one dimensional array operations on integer and float data values.
3. C program that implement library function to perform various String operations.
4. C program that implement manipulation of string without library function.
5. C program that implement function and parameters of array, string, float and integer data types and test different parameter passing mechanisms.
6. C program that implement function to perform string operations
7. C program that implement recursive function
8. C program process one dimensional array using pointer.
9. C program process two dimensional array using pointer.
10. C program that implement file operations on text file.
11. C++ program implements function with default argument and variable number of arguments.
12. C++ program that contains all access control specifiers, Static members and copy constructor.
13. C++ program that creates class objects dynamically and pass objects to a function.
14. C ++ program that implement function overloading
15. C++ program that demonstrates operator overloading and uses simple data types, string and manipulation of Objects.
16. C++ program that demonstrates the purpose and usage of function template and class template.
17. C++ program that demonstrates the dynamic binding through virtual functions.
18. C++ program that demonstrates the
    a. Multilevel inheritance
    b. Hybrid inheritance
    c. Hierarchical inheritance
    d. Simple inheritance
    e. Multipath inheritance
19. C++ program that demonstrate the behavior of access specifies in the presence of inheritance.
20. ++ program that demonstrates the working of Object composition and delegation
21. C++ program to perform file operations using file streams and error handling mechanism.

First Semester MCA

(5P2B18) INFORMATION & COMMUNICATION TECHNOLOGY LAB

TASK 1: Introduction to Computer's, Advantages and Disadvantages of computers Draw the block diagram of computer.

TASK 2: Identify the peripherals of a computer like Input and Output Devices.

TAKS 3: Identify the Components of a CPU and their function, components with the configuration of each peripheral device is to be submitted to your instructor.

TASK 4: Every student should dissemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a viva.

TASK 5: Demonstrate an experiment for testing the hardware failures in a Computer.

TASK 6: Demonstrate an experiment for testing the software failures in a Computer.

TASK 7: Identify the components of network like Network Interface Cards, Hubs, Switches, Bridges, Routers, Gateways, Modems and Transmission Media.

TASK 8: Students should get connected to their Local Area Network and access the internet. In the process they configure the TCP/IP setting.

TASK 9: Students should do BIOS settings for configuration of system. For example student can change booting option.

TASK 10: Demonstrate how to access the website and how to use the search engines. A few topics would be given to the students for which they need to search on Google.

TASK 11: Demonstrate how to create email ids for sending mails with attachments and show down loading procedure files.

TASK 12: Develop a static web page using frames, tables, forms, lists, hyperlinks, images etc.
TASK 13: Develop a dynamic web page based on task 11 by using JavaScript for performing basic validations.

TASK 14: Develop a well formed XML page for storing employee/student/some other information.

TASK 15: Demonstrate the usage of TELNET.

First Semester MCA

(5P2C19) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Syllabus:

The following course content is prescribed for the English Language Laboratory Practice

1. **Phonetics- Introduction to the Sounds of English – vowels, Diphthongs and consonants**
2. **Situational Dialogues/Role play**
3. **Reading Comprehension**
4. **Oral Presentations/Public speaking**
5. **Group Discussion**
6. **Interviews**
7. **Resume**
8. **Listening Comprehension**

Lab Manual cum Record:
Manual cum Record prepared by the teachers will be used by the students during laboratory hours

SUGGESTED SOFTWARE:

- Sky Pronunciation Suite
- Clarity Pronunciation Power 1
- Active Listening from Clarity
- Active Reading from Clarity
- It's your Job from Clarity G
- Globarena Career Lab
- Cambridge Advanced Learners' Dictionary with exercises
- Oxford Advanced Learner's Compass, 7th Edition

BOOKS SUGGESTED FOR ENGLISH LAB:

- Developing Communication Skills by Krishna Mohan &MeeraBenerji (Macmillan)
- Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
- Oxford Practice Grammar with Answers, John Eastwood, Oxford
- Handbook of English Grammar and Usage, Mark Lester and Larry Beason, Tata McGraw-Hill
- A text book of English Phonetics for Indian Students by T. Bala subramanian (Macmillan)
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- English Skills for Technical Students, WBSCTE with British Council, OL
- Everyday Dialogues in English by Robert J Dixson, Prentice – Hall of India Ltd.
- Professional Communication by Koneru, McGraw Hill.

Second Semester MCA

(5P2B21) COMPUTER ORGANIZATION

COURSE PREREQUISITES
- Introduction to Computer Science
- Introduction to Programming

COURSE OBJECTIVE

Graduates shall be able to
1. Describe various data representations and explain how arithmetic and logical operations are performed by computers
2. Explain the basic operation and relationship between the different components of computer.
3. Understand the advanced architecture of microprocessors
4. Write assembly programs for 8086 microprocessors

EXPECTED COURSE OUTCOMES

After going through this course the student will be able to:

CO1: Understand the organization and architecture of a computer system.

CO2: Design and implement programs using assembly language.

CO3: Analyze the need for Logic circuits in digital system.

CO4: Create logic circuits for real time applications.

UNIT I

NUMBER SYSTEMS AND COMPUTER ARITHMETIC: Signed and unsigned numbers, complements, Addition and subtraction, Multiplication, Division, Floating point representation, Gray code, BCD codes, Boolean algebra, Simplification of Boolean expressions, K-Maps. Combinational and Sequential Circuits: Decoders, Encoders, Multiplexers, Half and Full adders, Sequential circuits, Flip-flops.

UNIT II

MEMORY ORGANIZATION: Memory hierarchy, Main memory-RAM, ROM chips, Memory address map, Memory contention to CPU, Associative Memory-Hardware logic, Match, Read and Write logic, Cache Memory-Associative mapping, direct mapping, Set-associative mapping.

UNIT III

BASIC CPU ORGANIZATION: General Register Organization, Stack Organization, Instruction Formats- Zero, one, two, and three address instructions, Instruction formats-INTEL-8086 CPU Architecture, Addressing modes.

UNIT IV

INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS: Data transfer instructions, Input-Output instructions, Flag transfer, arithmetic, logical, shift and rotate instructions, Conditional and unconditional transfer, Iteration control, Interrupts, Assembler directives, Programming with assembly language instructions.

UNIT V

MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro program example, Design of Control Unit, Input-Output Organization: Peripheral devices, Modes of transfer, Priority interrupts - Daisy chaining, parallel priority, DMA- DMA control, DMA transfer, Input output processor-CPU-IOP communication.

TEXT BOOKS:

1. Computer System Architecture, M. Morris Mano, 3rd Edition, PHI/Pearson Education, 2008.
2. Fundamentals of Computer Organization and Design, Sivarama P.Dandamudi, Springer Int. Edition.
3. Assembly Language programming, Peter Albert.

REFERENCE BOOKS:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings, 7th Edition, Pearson/PHI, 2007
3. Intel 8086 programming, V. Douglas Hall, Tata McGraw-Hill.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	1	-	2	2	-	-	-	2
CO2	3	2	1	2	1	1	2	3	-	-	-	-
CO3	3	3	1	3	2	-	2	2	-	1	2	1
CO4	3	3	1	3	2	1	1	1	-	1	1	1

Correlation Level 1,2 or 3 as defined below:
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Second Semester MCA

(5P2B22) BUSINESS DATA PROCESSING

COURSE PREREQUISITES
- Developing programs related to data processing
- Testing and maintaining systems of data

COURSE OBJECTIVE
1. The basic objective of data processing is to handle huge data in order to enable the organization to function efficiently.
2. To improve productivity, various measures are to be identified and implemented. It is possible through the properly designed data processing system.
3. By using effective data processing system it Helps in Decision-making

EXPECTED COURSE OUTCOMES
1. By applying data processing techniques it is possible to office automation.
2. To understand the problems and able to take right decision
3. To maintain the performance of the organization at best possible level various functions at different levels of the organization are to be coordinated
4. Data processing provides Proper and Timely Information

UNIT I

INTRODUCTION: History of COBOL, Basic Structure of a COBOL Program, Coding format for COBOL programs, Character Set, COBOL Words, Data names and Identifiers, Types of Data, IDENTIFICATION DIVISION- Paragraphs in the IDENTIFICATION DIVISION, ENVIRONMENT DIVISION- Sections of the ENVIRONMENT DIVISION, and Assigning Files to devices in the ENVIRONMENT DIVISION.

UNIT II

DATA DIVISION: The file section of the DATA DIVISION, The Working-Storage Section of the DATA DIVISION, Procedure Division – DISPLAY and ACCEPT Statements, Moving data and printing information, computing in COBOL: The Arithmetic verbs, DECISION MAKING: Decision making using the IF and EVALUATE statements, Basic PERFORM Statement, Alter statement, Exit Statement, Conditional Statements.

UNIT III

DIFFERENT TYPES OF CLAUSES AND VERBS : Usage Clause, Synchronized Clause, Justified Clause, Redefines Clause and Renames Clause, Sign Clause, Text Manipulation with the STRING and UNSTRING Statement, Interactive Processing using SCREEEN Section.
ARRAY PROCESSING AND TABLE HANDLING: Different Types of PERFORM Statement, Single-Level Arrays and Tables, Multiple-Level Arrays and Tables.

UNIT IV

WORKING WITH FILES IN COBOL:
SEQUENTIAL FILE PROCESSING, SORTING AND MERGING: Sequential File Processing: Systems overview of Sequential File Processing, Sequential File Updating, Sorting and Merging: The SORT Feature, The MERGE Statement and Sample Programs, INDEXED AND RELATIVE FILE PROCESSING: Indexed File Processing: Systems Considerations for Organizing Disk Files, Processing Indexed Disk Files, and Relative File Processing: Processing Relative Disk Files.

UNIT V

REPORT WRITER AND SUBROUTINES: Report writer: Benefits of Report Writing Module, The Report Section in the Data Division, Procedure Division Statements. Subroutines: Structure of a COBOL Subroutine, COPY and CALL Statement, Advantages and Disadvantages of COBOL Subroutines.

TEXT BOOKS

1. COBOL Programming including MS COBOL and COBOL-85, M K Roy and D Ghosh Dastidar, 2nd Edition, Tata McGraw Hill, 2001.
2. Structure COBOL Programming, Nancy Stern and Robert A Stern, 8th Edition, John Wiley & Sons, 2008.

REFERENCES

1. Structured COBOL Programming, Fray B Shelly, Thomas J Cashman, Roy O Foreman, 2nd Edition, Thomson Course Technology, 1999.
2. Introduction to COBOL, A Guide to Modular Structured Programming, David M. Collopy, 1st Indian Reprint, Pearson Education, 2005

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	1	-	1	-	-	1	1	-
CO2	2	2	1	2	-	-	1	-	2	-	1	-
CO3	1	2	1	3	-	-	1	-	-	2	-	-
CO4	-	1	1	1	-	2	2	-	1	1	3	-

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Second Semester MCA

(5P2C23) NUMERICAL METHODS

COURSE PREREQUISITES: Differential and Difference Equations

COURSE OBJECTIVE

The purpose of this module is to provide participants with the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analyzing and interpreting the results obtained.

EXPECTED COURSE OUTCOMES

CO1: Analyze the errors obtained in the numerical solution of problems.

CO2: Using appropriate numerical methods, determine approximate solutions to systems of linear equations.

CO3: Using appropriate numerical methods, determine the best fit linear and non-linear curves.

CO4: Demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.

CO5: Using appropriate numerical methods, determine approximate solutions to ordinary differential equation.

UNIT-I

Approximations and Errors in Computations: Accuracy of numbers – Errors – useful rules for estimating errors – Error propagation – Error in the approximation of a function – Error in a series approximation**, Solution of algebraic and transcendental equations:** Bisection method – method of false position – secant method – Newton Raphson method – Muller's method.

UNIT-II

Solutions of linear simultaneous algebraic equations – Gauss eliminating method – Factorization Method – Jacobi's method – Gauss Seidal method – relaxation method - Eigen values and Eigen vectors using power method.

UNIT-III

CURVE FITTING: The method of least squares – fitting of linear and nonlinear curves - Coefficient of Correlation - Linear Regression– multiple regressions.

UNIT-IV

INTERPOLATION: Introduction – Newton's forward and backwards interpolation formulae – Gauss's forward and backwards interpolation formulae – Sterling's and Bessel's formulae.

UNIT-V
Numerical solution of Ordinary Differential equations - Taylor's series - Euler's Method – Picard's Method - Runge-Kutta Fourth Order Method – Milne's Predictor-Corrector Method

TEXT BOOKS:
Numerical Methods in engineering and science with programs in C &C++, B.S Grewal, 9th Edition, Khanna Publishers

REFERENCE BOOKS:
1. M K Jain, S.R.K.Jain, R.K.Jain: Numerical Methods for Scientific and Engineering Computation, 5th edition, New Age International Publishers.
2. Veerarjan and Ramachandran, Numerical Methods with programs in C, Tata McGraw Hill.
3. Numerical Mathematics and Computing by Ward Cheney and David Kincaid, 5th edition, Thomson Publications.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

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CO2	3	2	-	-	-	-	2	2	-	-	1	-
CO3	3	3	1	-	3	1	1	1	-	1	-	-
CO4	2	1	-	-	3	-	2	1	-	-	-	-
CO5	2	2	2	-	2	-	-	-	-	-	-	-

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Second Semester MCA

(5P2C24) OPERATIONS RESEARCH

COURSE PREREQUISITES: Nil

COURSE OBJECTIVE
- Formulate a real-world problem as a mathematical programming model
- Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
- Understand the relationship between a linear program and its dual, including strong duality and complementary slackness
- To introduce the operations research techniques such as Linear Programming, Integer Programming

EXPECTED COURSE OUTCOMES
- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimisation problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

UNIT I

Introduction to Operations Research-Basic definition, Scope, Objectives, Phases, Models and Limitations of Operations Research, Linear Programming Problem – Formulation of LPP, Simplex Method, Big-M method, Two-phase Method, Degeneracy and Unbound solutions, Revised simplex method, Duality, Dual simplex method.

UNIT II

Transportation Problem – Formulation, Unbalanced Transportation problem, Finding basic feasible solutions - Northwest corner rule, least cost method and Vogel's approximation method, Optimality test –MODI method, Assignment model – Formulation, Hungarian method for optimal solution, Solving unbalanced problem, Travelling salesman problem as assignment problem.

UNIT III

Sequencing models : Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines Processing n Jobs through m Machines.

UNIT IV

Replacement Models: Individual replacement policy, Group replacement policy, Game Theory: Competitive games, Rectangular game, Saddle point, Minimax (Maximin) method of optimal strategies, Value of the game, Solution of games with saddle points, Dominance principle, Rectangular games without saddle point – mixed strategy for 2 X 2 games.

UNIT V

Inventory models: Inventory costs, Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non – uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

TEXT BOOKS:
1. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, 2005.

REFERENCES
1. Operations Research, R. Panneerselvam 2/e, PHI 2008
2. Operations Research, P.K. Gupta and D.S. Hira, S.Chand & CO., 2007

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	1	-	2	-	3	1	1	-	3	-
CO2	-	2	-	-	-	-	3	2	-	-	1	-
CO3	-	2	1	-	3	1	3	3	-	1	-	-
CO4	-	2	-	-	3	-	2	3	-	-	-	-

Correlation Level 1,2 or 3 as defined below:
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Second Semester MCA

(5P2A25) ORGANIZATION STRUCTURE AND PERSONAL MANAGEMENT

COURSE PREREQUISITES: Knowledge of organizing as a function of management.

COURSE OBJECTIVE

- Students will study the structure and dynamics of organizational open systems.
- There will be a focus on the external environment, technology, structure (and their interrelationship), organizational culture and change management.
- This course will also address the actions that managers must take to ensure that behavior within the organization aids rather than impedes achievement of overall organizational goals.

EXPECTED COURSE OUTCOMES
- Explore the organization structures and systems approach to organization development.
- Analysis of organizational theories and conceptualize these with contemporary organizational designs.
- Describe the interaction of organizational designs and competitive strategies.
- Explain how organizations both affect and are affected by their environments
- Have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling.

UNIT I

INTRODUCTION TO MANAGEMENT: Concepts of Management and organization – Nature, Importance, Functions and theories of management, Systems approach to management, leadership styles, and Social responsibilities of management. Introduction to Organization: Designing Organizational structures: Basic concepts related to Organization – Department and Decentralization, Types and structures of organization.

UNIT II

DECISION PROCESS APPROACH: Parts of organization system, Dynamics of decision, Role of system, Personnel Management: Evolution, Objectives, Personnel Policies, Personnel management vs HRM, Position of the personnel department in the organization, Role of personnel manager as line manager and staff manager.

UNIT III

MAN POWER PLANNING: Need-strategies and limitations, Manpower inventory, Manpower forecasting, Job description, Recruitment, Job specification and selection, Interviewing techniques, Transfers and promotion policies, Training And Development: Objectives and

policies planning, Organizing the training department, Training manager and his job, on and off the job training techniques, Career planning, Objectives of performance appraisal.

UNIT IV

COMMUNICATION: Importance of communication, Interpersonal communication, Barriers of communication, Communication in organizations, Using communication skills to manage conflicts, Personality– Transactional Analysis, Perception: Perceptual process, Development of Attitudes and Values, Team Effectiveness.

UNIT V

CONTEMPORARY STRATEGIES: Total Quality Management (TQM), Six sigma, People Capability Maturity Model (PCMM) levels, Performance management, Business Process Outsourcing (BPO), business process re-engineering, bench marking and balanced score card.

TEXT BOOKS:
1. Dr. LM Prasad, "Principles & Practice of Management", 7e, S.Chand series.
2. Organization Structure and Personnel Management, P.Subbarao HPH, 2009.
3. Organizational Behavior, Aswathappa.K: Himalaya Publishers.

REFERENCES:
1. Industrial Business Management, Martand T Telsang, S.Chand.
2. Human Resources Management, Dr L.M.Prasad, S.Chand.
3. Dynamic Personnel Administration, Rudrabasavaraj MN, Himalaya.
4. Personnel Management, Mamoria & Gankar, HPH, 2009.

MODE OF EVALUATION
   Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	3	3	3	3	3	3	2
CO2	3	1	-	-	3	1	3	-	3	3	3	2
CO3	2	2	3	-	-	3	2	-	3	3	3	2
CO4	2	2	-	-	-	2	2	-	3	3	3	3
CO5	1	1	-		-	3	3	-	2	3	3	3

   Correlation Levels 1,2 or 3 as defined below:
   1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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Second Semester MCA

(5P2B26) DATA STRUCTURES

COURSE PREREQUISITES: Programming Fundamentals

COURSE OBJECTIVE
 1. To teach efficient storage mechanisms of data for an easy access.
 2. To design and implementation of various basic and advanced data structures.
 3. To introduce various techniques for representation of the data in the real world.
 4. To develop application using data structures.
 5. To teach the concept of protection and management of data.
 6. To improve the logical ability

EXPECTED COURSE OUTCOMES
 1. Student will be able to choose appropriate data structure as applied to specified problem definition.
 2. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
 3. Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
 4. Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT I

INTRODUCTION TO DATA STRUCTURES: Fundamentals of Data Structures, classification of data structures, Algorithm Analysis – Asymptotic notation –Efficiency classes – Mathematical analysis of Non recursive algorithm - Mathematical analysis of recursive algorithm.

UNIT II

ARRAYS, LISTS, STACKS AND QUEUES: Arrays: Implementation – Operations- Applications Linked List: Implementation – Operations- Applications Stack: Implementation – Operations - Applications, Queues: Implementation – Operations – Applications.

UNIT III

SORTING, SEARCHING: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Radix Sort and Quick Sort, Searching: Linear Search, Binary Search, and Fibonacci Search.

UNIT IV

NON LINEAR DATA STRUCTURES AND HASH TABLES
Introduction- Definition and Basic terminologies of trees and binary trees- Representation of trees, Binary tree Traversals- Threaded binary trees- Hash Tables: Introduction- Hash Tables-

Hash Functions and its applications, Closed hashing, comparison of collision resolution techniques.

UNIT V

ADVANCED TREES: Graphs- basic concepts –- representation and traversals. Introduction- Binary Search Trees: Definition- Operations and applications. Height Balanced Trees, AVL Trees: Definition- Operations and applications, B Trees: Definition- Operations and applications, Red – Black Trees- Splay Trees and its applications.

TEXT BOOKS:
1. Samanta.D, "Classic Data Structures", Prentice Hall of India (PHI).

REFERENCES:
1. Mark Allen Weiss, "Data Structures and Problem Solving using C++", The Benjamin Cummings / Addison Wesley Publishing Company, 2002
2. Pai G.A.V., "Data Structures and Algorithms", TMH, 2009,
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran "Fundamentals of Computer Algorithms", 2nd edition, University Press, 1996

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	-	-	-	-	-	-	1
CO2	3	1	2	1	1	1	1	-	2	-	-	1
CO3	3	2	1	1	2	1	2	-	1	-	1	1
CO4	2	1	1	2	1	1	2	-	-	-	2	1

Correlation Levels 1,2 or 3 as defined below:
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Second Semester MCA

(5P2B27) ASSEMBLY LANGUAGE PROGRAMMING LAB

Write Assembly Language Programs for the following using MASM.

1. Write an ALP of 8086 to take a string as input and do the Following Operations on it.

   a. Find the length
   b. Find it is Palindrome or not
   c. Find whether given string is substring or not.
   d. Reverse a string
   e. Concatenate by taking another string

2. Write an ALP of 8086 to take N numbers as input and do the following operations on them.
   a) Arrange in ascending and descending order.
   b) Find max and minimum

3. Write the ALP to implement the above operations as procedures and call from the main procedure.

4. Write an ALP of 8086 to find the factorial of a given number as a Procedure and call from the main Program which display the result.

5. Write an assembly language program to read a string of characters from the user and that prints the vowel count.

Example: Input: Advanced Programming in UNIX
             Output:

Vowel	count
a or A	3
e or E	1
i or I	3
o or O	1
u or U	1

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Second Semester MCA

(5P2B28) COBOL LAB

Develop the Programs using the following concepts:

1. Using Arithmetic Verbs, MOVE Verb, ACCEPT Verb, DISPLAY Verb and COMPUTE Verb
2. Control Statements and Perform Statements
3. Table handling facilities
4. Create and process Sequential Files and to Process Master files using Transaction Files
5. Sort a File, Merge two Files and Search a File for a given record using search verb
6. Create and Process an Indexed File
7. Create and Process a Relative File
8. Program using subroutines
9. Program using report generator

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Second Semester MCA

(5P2B29) DATA STRUCTURES THROUGH C++ LAB

1. Program to perform the operations on Arrays.
2. Program to perform the operations on single linked list
3. Program to perform the operations of Double linked list
4. Program to perform the operations of double linked list using primitive data or structure data. Use dynamic representation of linked list.
5. Program to perform the operations of circular double linked list using primitive data or structure data. Use dynamic representation of linked list.
6. Program that demonstrates the polynomial manipulation using linked list.
7. Program to implement stack data structure using array representation.
8. Program to implement stack data structure using linked list representation.
9. Program to convert given infix expression to post fix expression.
10. Program to evaluate the given post fix expression.
11. Program to demonstrate the recursion implementation using stack.
12. Program to perform the operations of simple Queue. Use array representation.
13. Program to perform the operations of simple Queue. Use linked list representation.
14. Program to perform the operations of circular Queue. Use linked list/array representation
15. Program to perform the operations of De-queue. Use linked list/array representation
16. Program to perform the operations insert a node, delete a node, search and traverse using Binary Search Tree.
17. Program to accept a set of integer or float or string values and construct a Binary Search Tree then search for a given element.
18. Program to construct a Heap tree and sort the values.
19. Program to demonstrate the implementation of Priority Queue using Heap Tree.
20. Program to perform the operations insert a node, delete a node, search and traverse using Height Balanced Tree.
21. Programs to demonstrate the following Searching techniques using integer or float or string or structure data.
    1. Binary search
    2. Fibonacci search

Third Semester MCA

(5P2B31) DATABASE MANAGEMENT SYSTEMS

COURSE PREREQUISITES
Data structures and Algorithms, Algorithm Design and Analysis

COURSE OBJECTIVES
Graduates shall be able to
1. Explain database concepts and structures and terms related to database design, transactions and management
2. Demonstrate data modeling, normalization and development of the database
3. Formulate SQL statements for data definition, modification and retrieval of data
4. Analyze how databases are affected by real-world transactions
5. Design and build a simple database system

EXPECTED COURSE OUTCOMES:
After going through this course the student will be able to:
CO1: Explain the basic concepts of data models, database design for transaction processing and Query language
CO2: Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram
CO3: Transform high-level conceptual model to relational data model, populate database and formulate queries based on principles of normalization
CO4: Design and Implement a Database for any given problem

UNIT I

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS: Data Vs Information, Purpose of databases, Views of data, Database languages, Data models, Database architecture - users and administrators. E-R Model, Entity-Relationship diagrams, E-R diagrams design issues, Extended E-R features, Specialization, Generalization, Aggregation.

UNIT II

RELATIONAL MODEL: Structure of Relational database, Relational Algebra, Tuple relational calculus, Domain relational calculus, QBE (Query-by-Example), Data log.

UNIT III

STRUCTURED QUERY LANGUAGE (SQL): Introduction to SQL, SQL Operators, SQL Functions, Join queries, Sub queries, Nested queries, Views, Integrity constraints, Database design - Normalization: Normal Forms-1st, 2nd, 3rd and BCNF, Functional Dependencies, Multi - Valued Dependency-4th Normal Form, 5th NF/Projection-Join Normal form and De-Normalization.

UNIT IV

TRANSACTION MANAGEMENT: Transaction concept, ACID properties, Transaction state, concurrent execution, Concept of Serializability and Testing for Serializability, Recovery System: Storage structure, Recovery and atomicity, Log-Based Recovery, ARIES Recovery Technique and Remote Back systems.

UNIT V
STORAGE AND FILE STRUCTURE: Overview of Physical Storage media , Magnetic Disks, RAID, File Organization, Organization of Records in Files and Data-Dictionary Storage, Indexing and Hashing: Ordered Indices, B+-Tree Index Files, B-Tree Index files, Multiple-key access, Static and Dynamic Hashing, Bitmap indices.

TEXT BOOKS
1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan. Database system Concepts. McGraw Hill International Edition, 2006, 5th Ed.
2. Elmasri, Navate, Fundamentals of Database Systems, Person Education, 2008.

REFERENCES

1. C.J Date,Introduction to Database Systems, Pearson Education, 2009.
2. S.Shah and V. Shah SPD,Oracle for Professionals, The X team, 2010.
3. PS Deshpande, SQL/PLSQL for Oracle 9i , dreamtec Press, 2007.
4. Raghurama Krishna, Johannes Gehrke, Database management systems, TMH.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	3	-	1	2	2	2	-	1	2
CO2	2	-	-	2	-	-	3	1	2	-	-	-
CO3	1	-	-	1	-	1	1	-	1	-	1	-
CO4	3	-	2	3	-	-	2	2	2	-	1	1

Correlation Level 1,2 or 3 as defined below:
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Third Semester MCA

(5P2B32) COMPUTER COMMUNICATIONS

COURSE PREREQUISITES: Operating Systems and its lab

COURSE OBJECTIVE
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

EXPECTED COURSE OUTCOMES:
CO1 Independently understand basic computer network technology.
CO2. Understand and explain Data Communications System and its components.
CO3. Identify the different types of network topologies and protocols.
CO4. Enumerate the layers of the OSI model and TCP/IP. Explain the functions of each layer.
CO5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT I

INTRODUCTION: Applications of Networks, Network hardware, Network Software, Reference Models-OSI Reference model, TCP/IP Reference Model, OSI versus TCP/IPMULTIPLEXING AND SWITCHING TECHNIQUES: Frequency division Multiplexing, Synchronous Time division multiplexing, Statistical time division multiplexing, Circuits switching: Packet switching, Circuit-switch networks, Packet-switching principles, x.25, Frame relay.

UNIT II

DATA LINK LAYER: Data Link layer design issues, Framing, Error control, Flow control, Error Detection and Correction, Elementary data link protocols, Sliding Window protocols
MEDIUM ACCESS CONTROL: Channel allocation, Multiple access protocols-Aloha, CSMA, collision free protocols, Limited-Contention Protocols, Ethernet-Manchester Encoding, Back-off algorithm, Wireless LANs.

UNIT III

NETWORK LAYER : Network layer design issues, Routing Algorithms-the Optimality Principle, Shortest path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting routing and Congestion control algorithms, INTERNETWORKING: Connectionless versus connection oriented Tunneling, Internetwork Routing, Fragmentation, IP Protocol, IP Address Internet multicasting.

UNIT IV

TRANSPORT LAYER: Transport Services, Internet transport protocols- UDP, TCP, Wireless and Mobile Networks: Wireless Links and Network Characteristics, CDMA, Wi-Fi: 802.11 Wireless LANs, Architecture, MAC layer, Frame, IP Subnet, Bluetooth and Mobile IP

UNIT V

NETWORK SECURITY: Cryptography, Symmetric-key algorithms-DES, AES, Public-key algorithms-RSA, Digital Signatures, Authentication Protocols-Kerberos and e-mail security-PGP, PEM

TEXT BOOKS
1. Andrew S. Tanenbaum. Computer Networks, Pearson education, 2009, 4th Ed.
2. James F. Kurose, Keith W. Rose. Computer Networks- A Top-Down Approach Featuring the internet, Pearson education, 2009.

REFERENCE BOOKS
1. S. Keshav. An engineering Approach to Computer Networking, ATM Networks, the Internet and the Telephone Network. Pearson education, 2009.
2. Williams Stallings. Data and Computer Communication. PEA, 2003, 7th Ed.
3. Nadir F. Mir, Computer and Communication Networks. Pearson Education, 2009.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	3	-	-	3		1	-	-	3	-
CO2	3	-	2	-	3		1	2	-	-	-	-
CO3	1	-	-	-	1	-	-	-	-	-	2	2
CO4	3	-	-	-	-	-	-	-	-	-	1	1
CO5	3	-	-	-	-	-	-	-	-	-	2	2

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Third Semester MCA

(5P2B33) NETWORK PROGRAMMING

COURSE PREREQUISITES: Basic knowledge about operating system.

COURSE OBJECTIVE
- The Client/Server programming paradigm
- To make the students know about UNIX and LINUX environment
- Berkeley 'sockets' application programming interface

EXPECTED COURSE OUTCOMES:
- You will be acquainted with major internet applications and transport protocols
- You will understand the functional layering of network software architectures
- You will be able to write your own socket-based network application programs
- You will gain experience with using software tools for network troubleshooting

UNIT I

INTRODUCTION: Linux/UNIX Operating System; The Linux/UNIX Architecture; Features of Linux/UNIX; POSIX standard; Locating Commands: ; General Purpose Utilities:; Unix file system; Navigating the File System and Relative pathnames; Handling Ordinary Files; The Process basics, , time commands; Filters: grep, Regular Expression, egrep, fgrep.

UNIT II

ESSENTIAL SHELL PROGRAMMING AND FILE PROCESSING: shell variables; shell constants; command substitution; parameter substitution; shell meta characters; shell commands: test, control structures, arithmetic in shell, shell functions, input and output redirection, pipes and tee; FILE PROCESSING: File types, FILE stream, Standard I/O , file descriptor, system calls for file processing; File permissions and Security, System calls (chmod, chown), Directory management system calls .

UNIT III

LINUX / UNIX PROCESSES I: The Environment of a Process, main function, Process Termination, Memory Layout of a C Program, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, LINUX / UNIX PROCESSES II: Process Identifiers, fork, vfork, exit, wait, waitpid, waitid, wait3, wait4 functions, Race Conditions, exec functions, system Function, Process Accounting, User Identification, process Times, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp, tcsetpgrp, and tcgetsid Functions.

UNIT IV

SIGNALS: Signal types, Kernel Support for Signals, Signal function, signal mask, sigaction function. The sigsetjmp and siglongjmp Functions, kill, alarm, raise, pause, sigpause functions.

UNIT V

INTERPROCESS COMMUNICATION: Introduction; Pipes, pipe, popen Functions, Co-processes; FIFOs; XSI IPC; Message Queues; Semaphores, shared memory, Sockets: Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer system calls; Implementation of TCP/IP and UDP.

TEXT BOOKS

1. W.Richard Stevens, Stephen A. Rago. Advanced Programming in the UNIX Environment, Pearson Education / Prentice-Hall of India, 2005, 2nd Ed.
2. Sunitabha Das, UNIX concepts and applications –2010.

REFERENCE BOOKS

1. Terrence Chan. UNIX System Programming Using C++. Prentice-Hall of India / Pearson Education, 1999.
2. Marc J. Rochkind. Advanced UNIX Programming. Pearson Education, 2005, 2nd Ed.
3. Maurice. J. Bach. The Design of the UNIX Operating System. Pearson Education / PHI, 1987.
4. Uresh Vahalia. UNIX Internals. Pearson Education, 2001.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	1	1	-	-	-	1	1	-	3	-
CO2	-	-	1	-	-	-	-	2	-	-	1	-
CO3	-	-	1	2	-	1	-	-	-	1	-	-
CO4	-	-	1	3	-	-	-	3	-	-	-	-

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Third Semester MCA

(5P2B34) JAVA PROGRAMMING

COURSE PREREQUISITES:
- Java is related to C++, which is a direct descendant of C. Much of the character of Java is inherited from these two languages.
- From C, Java derives its syntax. Many of Java's object-oriented features were influenced by C++.
- In fact, several of Java's defining characteristics come from its predecessors (C and C++).

COURSE OBJECTIVE

- This course provides an introduction to object oriented programming (OOP) using the Java programming language.
- Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.
- Analyze a software development problem and express its essence succinctly and precisely.

EXPECTED COURSE OUTCOMES
- The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism.
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections.
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- Identify key entities and relationships in the problem domain; write succinct textual descriptions of problems in the style of a user manual.

UNIT I

CLASSES AND OBJECTS : Concepts of classes, objects, methods, access control, this keyword, garbage collection, simple java program, constructors, parameter passing, recursion, Enumeration, Auto-boxing: Enumeration, Type Wrappers, Auto boxing. Generics: What are Generics?, A Simple Generics Example, A Generics Class with two Type Parameters, The General Form of a Generic Class. String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf ( ), Changing the Case of Characters Within a String, Additional String Methods, String Buffer, String Builder.

UNIT II

INHERITANCE : Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance, Member access rules, super keyword and its uses, using final with inheritance, polymorphism- method overriding, abstract

classes, Method overloading, Inner Classes-Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

UNIT III
PACKAGES AND INTERFACES : Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, Interfaces vs Abstract classes, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring packages –java.util.

UNIT IV
EXCEPTION HANDLING AND MULTITHREADING: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups

UNIT V
FILES-STREAMS: Byte Streams, Character Streams, text Input/output, Binary input/output, random access file operations, File management using file class, using java.io, NETWORKING: Basics of network programming, addresses, ports, sockets, Socket connection and simple client server program, multiple clients, Java .net package,

TEXT BOOKS
1. Herbert schildt, Java. The complete reference. TMH, 2010, 7th Ed.
2. T. Budd. Understanding OOP with Java. Pearson education, 2008, Updated Ed.

REFERENCE BOOKS
1. J.Nino and F.A. Hosch. An Introduction to programming and OO design using Java. John Wiley and sons, 2004.
2. T. Budd. An Introduction to OOP. Pearson education, 2009, 2nd Ed.
3. Y. Daniel Liang. Introduction to Java programming. Pearson education, 2010, 6th Ed.
4. R.A. Johnson. An introduction to Java programming and object oriented application development. Thomson, 2009.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	3	3	3	-	3	-	3	-
CO2	3	3	3	-	3	3	3	-	3	-	3	-
CO3	2	3	3	-	2	3	3	-	3	-	2	-
CO4	1	2	3	-	1	2	3	-	1	-	2	-

Correlation Levels 1,2 or 3 as defined below:
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Third Semester MCA

(5P2B35) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE PREREQUISITES: Data Structures and Algorithms

COURSE OBJECTIVE

1. To analyze the asymptotic performance of algorithms.
2. To demonstrate a familiarity with major algorithms and data structures.
3. To apply important algorithmic design paradigms and methods of analysis.
4. To synthesize efficient algorithms in common engineering design situations.
5. To understand the difference between tractable and intractable problems, and be familiar with strategies to deal with intractability.

EXPECTED COURSE OUTCOMES

1. Ability to Understand, Analyze the performance of recursive and non recursive algorithms and use of asymptotic notations to measure the performance of algorithms.
2. Identify and analyze various algorithm design techniques
3. Understand and evaluate algorithms using various algorithm design techniques
4. Solve problems by applying appropriate algorithm design techniques and analyze the efficiency of various algorithms including parallel algorithms.
5. Ability to understand the limitations of Algorithm power and identify algorithm design techniques to cope up with the limitations.

UNIT I

INTRODUCTION: Algorithm, Pseudo code for expressing algorithm, Fundamentals of algorithmic problem solving, asymptotic notations, Recurrence equations – Solving recurrence equations –Analysis of linear search.

UNIT II

DIVIDE AND CONQUER: General Method, Merge sort, Quick sort, Binary search, Binary tree traversals and related properties.

UNIT III

DYNAMIC PROGRAMMING: General Method – Multistage Graphs – All-Pair shortest paths –Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem , Greedy Technique: General Method, Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm, single Source shortest paths.

UNIT IV

BACK TRACKING: General Method, 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem

UNIT V   '

Graph Traversals – Connected Components – Spanning Trees – Bi-connected components, NP-Hard and NP-Complete Problems: NP-Hard, NP-Complete classes, COOKS theorem.

TEXT BOOKS

1. T. H. Corman, C Leiserson, Rivest, Ronald and stein Clifford. Introduction to algorithms. MGH, New York, 2001, 2nd Ed.
2. Anany Levitin. Introduction to the design and analysis of algorithms. Pearson education, 2003, 2nd Ed.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)

REFERENCE BOOKS

1. E Horowitz, S Sahni, S Rajasekaran, Fundamentals of computer algorithms. Universities press, 2008, 2nd Ed.
2. Richard Neopolitan, Kumarss Naimipour. Foundations of algorithms using C++ pseudo code, Jones and Bartlett Learning, 1998, 2nd Ed.
3. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

MODE OF EVALUATION
   Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	-	-	-	-	-	-	-	-	-	3
2	3	3	-	-	-	3	-	-	2	-	-	2
3	3	2	2	-	-	3	2	-	2	-	2	3
4	3	3	3	3	-	2	3	-	-	-	2	2
5	3	3	3	2	-	3	2	-	2	-	2	3

Correlation Level 1,2 or 3 as defined below:
1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High), If there is no correlation, put " –"

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Third Semester MCA

(5P2B36) OPERATING SYSTEMS

COURSE PREREQUISITES: Computer Architecture and Organization

COURSE OBJECTIVES
1. Identify the concepts, principles and services of operating system
2. Understand the operating system functionalities managing with hardware
3. Analyze the structure and design decisions involved in the implementation of an operating System
4. Evaluate different algorithms related to different operating system components
5. Explore various operating system utility commands to manage operating system
6. Implement various operating system algorithms and its evaluation

EXPECTED COURSE OUTCOMES
After going through this course the student will be able to:
 CO1: Explain the fundamentals of operating system components and its
       functionalities
  CO2: Analyze the basic operating system resources and its management
        techniques
 CO3: Apply algorithms to handle the operations of an operating system
 CO4: Implement solutions for classical problems in managing the computer resources

UNIT I

OPERATING SYSTEM INTRODUCTION: Operating System Definition, Evolution of Operating Systems- Simple, Batch, Multi Programmed, Time-Shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System Calls, Types of System Calls.

UNIT II

PROCESS AND CPU SCHEDULING: Process Concepts- The Process, Process State, Process Control Block, Threads, Process Scheduling- Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms, PROCESS COORDINATION: Process Synchronization, the Critical-Section Problem, Peterson's Solution, Semaphores, Classic Problems of Synchronization.

UNIT III

DEADLOCKS: System model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

UNIT IV

MEMORYMANAGEMENT: Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Demand Paging, Performance of Demand

Paging, Page Replacement Algorithms, FILE SYSTEM INTERFACE: The Concept of a File, Access methods, Directory Structure, File System Structure, Allocation methods, MASS STORAGE STRUCTURE: Disk Attachment, Disk Scheduling algorithms.

UNIT V

PROTECTION: System Protection- Goals of Protection, Principles of Protection, Access Matrix, Implementation of Access Matrix, Security: - The Security Problem, Program Threats, System and Network Threats, User Authentication.

TEXT BOOKS:
1. Abraham Silberchatz, Peter B. Galvin. Operating System Principles. Wiley Student Edition, 2010, 8th Ed.
2. Andrew S Tanenbaum. Modern Operating Systems. Pearson/ PHI, 2011, 3rd Ed.

REFERENCE BOOKS
1. R. Elmasri, A.G.Carrick and D.Levine. Operating Systems. MGH, 2010.
2. A.S. Godbole. Operating Systems. TMH, 2009, 2nd Ed.
3. W. Stallings. Operating Systems-Internal and Design Principles, Pearson Education, 2009, 6th Ed.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	2	-	3	1	1	-	3	-
CO2	3	2	1	2	2	-	3	2	-	-	1	-
CO3	3	2	1	2	3	1	3	3	-	1	-	-
CO4	3	2	1	3	3	-	2	3	-	-	-	-

Correlation Level 1,2 or 3 as defined below:
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Third Semester MCA

(5P2B37) DBMS LAB

List of Sample Problems/Experiments

1. Creation, altering and drop of tables and inserting, deleting and update the rows into a table using SELECT Command.
2. Queries using integrity constraints.
3. Queries using SQL operators like, relational, logical and set operators.
4. Queries using Aggregate and SQL functions.
5. Queries using join conditions.
6. Create Views, Sequences.
7. Write a Simple PL/SQL Program to display students' details.
8. Create PL/SQL block using IF/ELSE IF/NESTED IF statement.
9. Create PL/SQL block using WHILE/FOR Loops.
10. Create PL/SQL block using CASE Statement.
11. Create PL/SQL block using CURSORS.
12. Create PL/SQL block using EXCEPTION handling.
13. Create PL/SQL block using FUNCTION, PROCEDURE, TRIGGER and PACKAGE.

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Third Semester MCA
(5P2B38) NETWORK PROGRAMMING LAB
List of Sample Problems/Experiments:

Experiment - 1:

A) The objective of this exercise is to give experience in using telnet to connect to the Linux host, login using the user id and password provided, and then to logout.

1. Fire up the telnet client specifying Lab system as the host.
2. When prompted provide your user id and password.
3. Logout or exit from the session.

B) The objectives of this exercise are to
   * 	Familiarize yourself with a couple of commonly used commands, and,
   * 	Let you explore the system a little.

1. Get help on the ls command, and then use the ls command to display the files and directories.
2. Find out who else is on the system.
3. What is your current directory (present working directory)?
4. Pipe the output of the ls –l / command to ls.output and see what you get.

C) The objectives of these exercises are to find out how you can see what a system is running and what resources the system is using.

1. Use the ps –ef | more command to locate what daemons are running on the system.
2. Use the top command to display the system activity.

Experiment - 2:

A) The objectives of these exercises are to:
See how Linux can handle multiple file systems
Examine the /proc file system which Linux uses to provide information about its internal operation

1. Find out what devices are mounted and what file systems are in use.
2. Examine a couple of the /proc files using the more command (hint, use the ls command to see what files exist within the /proc system).

The objective of this exercise is to familiarize you with the hierarchy of files within a file system.

3. Use the cd command to go to the "root" of the file system.
4. Use the cd command to go to your home directory.
5. Create a directory 'test' under your home directory.
6. Create a file 'real.file' within this directory.
7. Create a symbolic link in your home directory to 'real.file' called 'symbolic.link'.

B) The objective of this exercise is to work with files, directories and links.

Explore your file system:
 Identify 1st level directories
 Locate a symbolic link
 Use the umask command to display current default

Create 3 files ('all', 'group', 'owner') and assign permissions:
 All - r/w to owner, group, and others
  Group - r/w to owner and group, r/o to others
  Owner - r/w to owner, r/o to group, none to others

Experiment - 3:

Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

Experiment - 4:

Write a shell script that deletes all lines containing a specific word in one or more files which are supplied as argument to it.

Experiment - 5:

A) Write a shell script to find factorial of the given integer.
B) Write a shell script to print prime numbers upto given limit.

Experiment - 6:

Write an awk script to find number of characters, words, and lines in a file.

Experiment-7:

Write a C program to implement the "cat" utility (file creation, display, file appending, etc.)

Experiment - 8:

Write a C program that accepts one or more file/directory names as command line input and reports the information such as file type, file permissions, access times, etc.,

Experiment - 9:

Write a C program to list for every file in a directory, its inode number, size and file name.

Experiment - 10:

Write a C program that permits a parent process to accept an integer from standard input and communicate to child process. The child process then computes the factors up to that

integer and print.

Experiment - 11:

Write C programs that illustrate communication between two unrelated processes using a named pipe (FIFO).

Experiment - 12:

Write C programs that illustrate the communication between two unrelated processes using Message Queues/ Shared Memory.

Experiment – 13:

Write C programs that illustrate the communication between two processes using TCP/IP (or) UDP protocols with Socket.

REFERENCE BOOKS:

1. A practical guide to Linux commands, editors and shell programming: Mark G.sobell-2nd edition-Prentice hall, 2005.
2. W.Richard Stevens, Stephen A. Rago: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education / Prentice-Hall of India, 2005.
3. Terrence Chan: UNIX System Programming Using C++, Prentice-Hall of India / Pearson Education, 1999.

Third Semester MCA

(5P2B39) JAVA PROGRAMMING LAB

1. Programs using constructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs on interfaces.
5. Write programs on packages.
6. Write programs using function overloading and overriding.
7. Programs using inheritance.
8. Programs using IO streams.
9. Programs using files.
10. Write a program using exception handling mechanism.

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Fourth Semester MCA

(5P2B41) SOFTWARE ENGINEERING

COURSE PREREQUISITES: Database Systems

COURSE OBJECTIVE
1. To explain the basic terminologies and implement systems effectively using various system models
2. To comprehend the testing Process and software evolution in order to meet dynamic changing requirements
3. To develop understanding of advanced concepts and methods required for construction of large software systems
4. To apply project management strategies for effective software development

EXPECTED COURSE OUTCOMES

After going through this course the student will be able to:

CO1: Understand the basic terminologies and various Process models associated with software engineering
CO2: Comprehend the testing Process and software evolution
CO3: Analyze and Apply advanced software engineering concepts and methods for construction of large software systems
CO4: Evaluate project management strategies for effective software development

UNIT – I

Overview of System Analysis & Design, Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, Professional and ethical responsibility, Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

UNIT – II

Software Processes: Models, Process iteration, Process activities; The Rational Unified Process Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; the software requirements document, Requirements Engineering Processes: Requirements elicitation and analysis; Requirements validation; Requirements management, Requirement modelling: Context models; Behavioral models; Data models; Object models; Structured Methods.

UNIT – III

Design concepts: The Design process, Design Concepts, Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design Evolution.

UNIT – IV

VERIFICATION AND VALIDATION: Planning; Software inspections; automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation, Quality management: Quality concepts, Software Quality Assurance.

UNIT – V

SOFTWARE COST ESTIMATION: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.
Project Management: Management activities; Project planning; Project scheduling; Risk management

TEXT BOOKS

1. Ian Sommerville. Software Engineering. Pearson Education Publications, 2007 (Chapters-: 1, 2, 3, 4, 5, 6, 7, 8, 11, 14, 17, 21, 22, 23, 26), 8th Ed.
2. Roger S. Pressman. Software Engineering - A Practitioners approach. McGraw-Hill, 2007, 7th Ed.

REFERENCE BOOKS

1. Shari Lawrence P fleeger, Joanne M. Atlee. Software Engineering Theory and Practice. Pearson Education, 2006, 3rd Ed.
2. Waman S Jawadekar. Software Engineering Principles and Practice, Tata McGraw Hill, 2004.

MODE OF EVALUATION
   Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	2	3	1	1	2	3	1	1	-
CO2	1	-	1	2	2	1	1	2	2	-	2	1
CO3	1	1	3	2	2	1	1	1	3	1	1	1
CO4	2	-	2	1	2	2	1	3	2	1	1	2

Correlation Level 1,2 or 3 as defined below:
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Fourth Semester MCA

(5P2B42) SYSTEM SOFTWARE

COURSE PREREQUISITES: Computer Architecture and Organization

COURSE OBJECTIVE
The objective of this course is to explore the design and development of interrupt-driven and event-driven software. And also examine the components of sophisticated multilayer software systems, including device drivers, systems software, applications interfaces, and user interfaces.

EXPECTED COURSE OUTCOMES
> CO1: To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger
> CO2: Describe the various concepts of assemblers and microprocessors
> CO3: To understand the various phases of compiler and compare its working with assembler
> CO4: To understand how linker and loader create an executable program from an object module created by assembler and compiler.

UNIT-I

INTRODUCTION TO SYSTEMS PROGRAMMING: Evolution of the Components Of a programming System, Foundation of System Software Programming, machine Architecture – SIC, SIC/XE, machine language and Assembly language.

UNIT-II

INTRODUCTION TO ASSEMBLER: Introduction to assembler, Basic Functions Assembler, Features of Assembler, Assembler Design Options - one Pass and two Pass Assembler, Implementation Example.

UNIT-III

INTRODUCTION TO MACROS: Basic Macro Processor Functions Features of Macros, Design of Macro processor – one Pass and two Pass, Implementation Example

UNIT-IV

INTRODUCTION TO LOADERS: Basic Functions of a loader, Features of Loaders, Design of Loaders – Absolute and DLL, Implementation Example.

UNIT-V

INTRODUCTION TO COMPILERS: A brief discussion on various phases of compilers, Applications of FSM and grammars in compiler design.

TEXT BOOKS

1. Donovan. Systems Programming, Tata McGraw Hill, 2001.

REFERENCE BOOKS

1. Dhamdhere. System Programming. Tata McGraw Hill. Aug 1999, (2nd Revised Ed).
2. Leland, L.Beck. System Software. Pearson Education, Aug, 1996.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	2	3	1	-	2	3	1	1	-
CO2	1	-	1	-	2	-	1	-	2	-	-	1
CO3	1	1	3	2	-	1	1	-	3	1	-	1
CO4	2	-	2	-	2	2	-	-	-	1	1	2

Correlation Level 1,2 or 3 as defined below:
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Fourth Semester MCA
(5P2B43) ADVANCED JAVA FOR WEB TECHNOLOGIES

COURSE PREREQUISITES: Computer Networks

COURSE OBJECTIVE
- Explain the history of the internet and related internet concepts that are vital in understanding web development.
- Discuss the insights of internet programming and implement complete application over the web.
- Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.
- Utilize the concepts of JavaScript and Java.
- Use Web application development software tools i.e, AJAX and XML etc, and identify the environments currently available on the market to design web sites.

EXPECTED COURSE OUTCOMES
- Understand Mark-Up and Scripting language concepts and their applications.
- Demonstrate the working of dynamic documents in web designing.
- Analyze appropriate content layout design and event handling techniques.
- Implement static web document using HTML5, CSS, JavaScript and XML.

UNIT I

HTML COMMON TAGS: Introduction, HTML Basics- Text, Colors, Links, Images, Lists, Forms, Frames, Tables, Web Page Design, HTML5, Cascading Style Sheets- Introduction to CSS, Types of CSS, CSS3
JAVA SCRIPT: Introduction to JavaScript, Basics of JavaScript, Control Structures, Pop Up Boxes, Functions, Arrays, Events, Objects and Simple Web Application. JQUERY, XML: Introduction, Document type definition, XML Schemas, Document Object Model, XML and Data Binding, Presenting XML(XSL), XML Processors: DOM and SAX.

UNIT II

WEB SERVERS AND SERVLETS:
Introduction to Servlets, Web Servers, Deployment of Servlets- How to write servlet, how to execute servlet, Lifecycle of a servlet, JSDK, The Servlet API, The javax, servlet package, Reading Servlet parameters, Reading Initialization parameters, The javax, servlet HTTP package, Handling HTTP Request and Responses, Cookies, Session Tracking.

UNIT III

INTRODUCTION TO JSP: The Problem with servlet, The anatomy of JSP page, JSP Processing, JSP application design with MVC, Setting up and JSP environment, Installing the

Java Software Development Kit, Tomcat Server and Testing Tomcat, JSP Standard Tag Library(JSTL).

UNIT IV

JSP APPLICATION DEVELOPMENT: Generating Dynamic Content- Directive Elements, Template Text, Beans and JSP, Action Elements. Using scripting elements, Implicit JSP Objects, Conditional Processing- Declaring Variables and methods, Error handling and debugging

UNIT V

DATABASE ACCESS: Introduction, Database Programming with JDBC- How JDBC works, JDBC Architecture, JDBC Driver Types. Studying javax.sql.* package, Installation of MySQL, Accessing Database from JSP page- Use of Prepared Statement, Deploying Java Beans in a JSP Page.

TEXT BOOKS
1. Patrick Naughton and Herbert Schildt. Complete Reference Java. 2002, 2nd Edition
2. Hans Bergstan. Java Server Pages. SPD publications, 2003, 3rd Ed.

REFERENCE BOOKS
1. Knuckles. Web Applications Technologies Concepts. John Wiley, 2006, 1st Ed.
2. Wang. An Introduction to Web Design and Programming. Thomson, 2007, 1st Ed.
3. Pekowsky. Java Server Pages. Pearson, 2008.
4. D.Flanagan, Java Script, O'Reilly, SPD.
5. Michael Morrison, XML Unleashed, Tech Media
6. O'neil, Java Beans Programming, TMH, 2005.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	2	2	2	-	1	1	2
CO2	3	3	2	2	3	-	2	2	-	-	-	1
CO3	3	2	3	2	3	1	1	1	1	-	1	-
CO4	3	2	3	2	3	2	2	2	1	-	1	1

Correlation Levels 1,2 or 3 as defined below:
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Fourth Semester MCA
(5P2B44) DATA WAREHOUSING AND MINING

COURSE PREREQUISITES: Database Systems

COURSE OBJECTIVE
The student should be made to
1. Understand the concept of building a data warehouse and to analyze the mapping concepts.
2. Be familiar with the OLAP tools, application and its categories of application.
3. Understand the concept of data mining techniques, process and about its query languages.
4. Analyze the various mining association rules and understand the concept of classifications.
5. Be familiar with the cluster analysis and categorization of clustering methods.

EXPECTED COURSE OUTCOMES
CO1: Student able to design a data mart or data warehouse for any organization
CO2: Student able to asses raw input data and preprocess it to provide suitable input for range of data mining algorithms
CO3 Student able to extract association rules and classification model
CO4: Student able to identify the similar objects using clustering techniques
CO5: Student able to explore recent trends in data mining such as web mining, spatial-temporal mining

UNIT I

Introduction to Data Warehousing -Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining, Introduction to Data Mining: What is Data mining?, Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, A Multidimensional Data model.

UNIT II

Data Preprocessing, Language, Architectures, Concept Description- Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT III

Association Rules - Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

UNIT IV

Classification And Clustering - Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

UNIT V

Recent Trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

TEST BOOKS
1. Jiawei Han and Micheline Kamber. Data Mining-concepts and Techniques. Morgan Kallfman March 2006, 2nd Ed.

REFERENCE BOOKS
1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2004
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2004.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	3		1	-	-	3	-
CO2	3	3	2	3	3		1	1	-	-	-	-
CO3	3	3	-	3	3	-	-	-	-	-	2	2
CO4	3	3	-	3	-	-	-	-	-	-	2	2
CO5	3	3	-	3	-	-	-	-	-	-	2	2

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Fourth Semester MCA

(5P2B4A) CLOUD COMPUTING

(Elective I)

COURSE PREREQUISITES

- Student must know about different computing models
- A basic knowledge of Virtualization Technologies and Operating Systems

COURSE OBJECTIVE

1. The objective of this course is establishing the definition of cloud computing,
2. Describing the various service delivery models of a cloud computing architecture
3. Explaining the ways in which clouds can be deployed as public, private, hybrid, and community clouds.

EXPECTED COURSE OUTCOMES

1. Ability to identify various cloud services.
2. Assess cloud characteristics and service attributes, for compliance with enterprise objectives.
3. Explain the four primary cloud category "types".
4. Evaluate various cloud delivery models.
5. Contrast the risks and benefits of implementing cloud computing.

UNIT I

Cloud Computing Introduction, History of Cloud Computing, uses, services, types of cloud computing. Applications of Cloud Computing, feature perspective and developments of cloud computing.

UNIT II

Working of cloud computing and Collaboration of Cloud computing, Centralizing email communication, cloud computing for community, collaboration on schedules, collaborating on group projects and events, cloud computing for corporation and mapping scheduling & managing projects.

UNIT III

Collaborating on calendars, schedulers and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets and databases

UNIT IV

Evaluating web mail services, evaluating instant messaging, evaluating web conference tools, Creating groups on social networks, evaluating on line groupware, collaborating via blogs and wikis.

UNIT V

Understanding cloud Storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web bases desktops.

TEXT BOOK

1. Michael Miller. Cloud computing. Pearson Education, New Delhi, 2009.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	1	1	-	1	-	1	-	-	1
CO2	3	2	1	2	-	-	1	-	1	-	1	-
CO3	3	2	1	3	-	-	1	-	-	2	-	-
CO4	-	2	-	1	-	-	2	-	3	-	-	2
CO5	-	1	1	-		-	-	2	-	1	-	-

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Fourth Semester MCA
(5P2B4B) COMPUTER GRAPHICS AND MULTIMEDIA
(Elective – I)

COURSE PREREQUISITES: Linear Algebra, Programming Fundamentals

COURSE OBJECTIVE
* Understand how linear Algebra is important in the context of Computer Graphics.
* Demonstrate foundational knowledge of modelling and representations of 3D shapes.
* Understand how real time shading and lighting is implemented.
* Implement an interactive application using ThreeJS and WebGL.
* Communicate their design ideas, models, implementations and outcomes.

EXPECTED COURSE OUTCOMES
CO1: Understand the basic principles of implementing copmputer graphics primitives
CO2: Familiarity with key algorithms for modelling and rendering graphical data
CO3: Develop design and problem solving skills with application to computer graphics
CO4: Gain experience in constructing interactive computer graphics programs using OpenGL

UNIT I

Introduction and Output Primitives -Introduction – Applications - Overview of Graphics System – Introduction to OpenGL – Output Primitives – Line, Circle and Ellipse Generating Algorithms – Interactive Input Methods.

UNIT II

2D - Graphics- Two Dimensional Transformations -Basic Transformations, Reflection – Shear-2D Viewing Pipeline – Window to Viewport Mapping - Clipping – Polygons - Splines - Bezier Curves.

UNIT III

3D - Graphics - 3D Transformations - Viewing a 3D scene - Visible Surface Detection Methods – Visualization and polygon rendering – Color Models – Computer Animation – General Animation Functions - Key Frame systems - Morphing.

UNIT IV

Overview of Multimedia - Definition - Multimedia Elements Overview - Multimedia Hardware and software – Compression and Decompression - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

UNIT V

Multimedia Systems and Applications
Multimedia Communication systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – Video on Demand – Introduction to VRML.

TEXT BOOKS
1. Donald Hearn and M. Pauline Baker, "Computer Graphics with OpenGL",Third Edition, 2004,Prentice Hall.
2. Ranjan Parekh, "Principles of Multimedia", 1st Edition, 2006, Tata McGraw-Hill Education.

REFERENCE BOOKS
1. Hearn D and Baker M.P, "Computer graphics – C Version", 2004, 2nd Edition, Pearson Education
2. Angel Edward," Interactive Computer Graphics - A Top-down Approach With Opengl", 2000, 2nd Edition
3. Andries van Dam, F. Hughes John, James D. Foley, Steven K. Feiner, "Computer Graphics: Principles and Practice in C", 2nd Edition, 2002, Pearson Education.
4. Ralf Steinmetz, Klara steinmetz, "Multimedia Computing, Communications and Applications", 2004, Pearson education

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	1	-	-	2	-	1	-	-	1
CO2	-	2	-	2	-	-	-	-	1	-	-	-
CO3	-	2	-	3	-	-	3	-	-	-	-	-
CO4	-	2	-	1	-	-	1	-	1	-	-	2

Correlation Levels 1,2 or 3 as defined below:
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Fourth Semester MCA
(5P2B4C) SOFTWARE PROJECT MANAGEMENT
(Elective I)

COURSE PREREQUISITES
Student must know about Project planning, execution, monitoring and controlling

COURSE OBJECTIVE
1. The objective of this course is to study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software
3. To understand the software project management process and successful software projects that support organization's strategic goals.
4. To implement the project plans through managing people, communications and change

EXPECTED COURSE OUTCOMES
1. To understand the basic concepts and issues of software project management to effectively Plan the software projects.
2. To implement the project plans through managing people, communications and change.
3. To select and employ mechanisms for tracking the software projects.
4. To develop the skills for tracking and controlling software deliverables.
5. To create project plans that address real-world management challenges.

UNIT I

FUNDAMENTALS: Conventional software management - Evolution of software economics - Improving software economics - Conventional versus modern software project management.

UNIT II

SOFTWARE MANAGEMENT PROCESS FRAMEWORK: Lifecycle phases - Artifacts of the process - Model based software architectures - Workflows of the process - Checkpoints of the process.

UNIT III

SOFTWARE MANAGEMENT DISCIPLINES: Iterative process plans - Organization and responsibilities - Process automation - Process control and process instrumentation - Tailoring the process.

UNIT IV

MANAGED AND OPTIMIZED PROCESS: Data gathering and analysis - Principles of data gathering - Data gathering process - Software measures - Data analysis - Managing software quality - Defect prevention.

UNIT V
CASE STUDIES: COCOMO cost estimation model - Change metrics - CCPDS-R.

TEXT BOOKS
1. Walker Royce, "Software Project Management - A Unified Framework", Pearson Education, 2004.
2. Humphrey Watts, "Managing the Software Process", Addison Wesley, 1989.
3. REFERENCES
4. Humphrey Watts, "Managing the Software Process", Addison Wesley, 1989.
5. Ramesh Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
6. Bob Hughes and Mikecotterell, "Software Project Management", 3rd Edition,
7. Tata McGraw Hill, 2004.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	1	1	-	1	-	1	-	-	1
CO2		2	1	2	-	-	1	-	1	-	1	-
CO3		2	1	3	-	1	1	-	-	2	-	-
CO4	-	2	-	1	-	-	1	-	1	-	-	2
CO5	-	1	1	-		-	-	2	-	1	-	-

Correlation Levels 1,2 or 3 as defined below:1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

Fourth Semester MCA

(5P2B4D) DISTRIBUTED DATABASES

(Elective II)

COURSE PREREQUISITES: Database systems

COURSE OBJECTIVE

This **course** will introduce principles and foundations of **distributed databases**, including architecture, design issues, integrity control, query processing and optimization, transactions, and concurrency control.

EXPECTED COURSE OUTCOMES
1. Explain the techniques used for data fragmentation, replication, and allocation during the distributed database design process.
2. Evaluate simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.
3. Explain how the two-phase commit protocol is used to deal with committing a transaction that accesses databases stored on multiple nodes.
4. Describe distributed concurrency control based on the distinguished copy techniques and the voting methods.

UNIT I

DISTRIBUTED DATABASES: An Overview Features of Distributed versus Centralized Databases, Why Distributed Databases? Distributed Database Management Systems (DDBMSs), Architecture for Distributed Databases, Types of Data Fragmentation, Distributed Database Access Primitives.

UNIT II

LEVELS OF DISTRIBUTION TRANSPARENCY: Distribution Transparency for Read-Only Applications, Distribution Transparency for Update Applications, and Integrity Constraints in Distributed Databases, Distributed Database Design: A Framework for Distributed Database Design, the Design of Database Fragmentation, and The Allocation of Fragments.

UNIT III

OPTIMIZATION OF ACCESS STRATEGIES: A Framework for Query Optimization, Join Queries, General Queries, The Management of Distributed Transaction: A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions.

UNIT IV

CONCURRENCY CONTROL: Foundations of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control Based on Timestamps. Reliability: Basic Concepts, Non-blocking Commit Protocols, Checkpoints and Cold Restart.

UNIT V

DISTRIBUTED DATABASE ADMINISTRATION: Catalog Management in Distributed Databases, Authorization and Protection, Commercial Systems: IBM's Inter System Communication.

TEXT BOOK
1. Stefano ceri, Giuseppe Pelagatti. Distributed Databases Principles and System. MGH, Aug 2008.

REFERENCE BOOK
1. M.tamer ozsu, Patrick valduriez. Principles of Distributed database systems. July 2007, 3rd Edition.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

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CO3	-	-	-	2	3	1	-	-	-	1	-	-
CO4	-	-	-	3	3	-	2	-	-	-	-	-

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Fourth Semester MCA

(5P2B4E) ARTIFICIAL INTELLIGENCE

COURSE PREREQUISITES: Data Structures and Algorithms

COURSE OBJECTIVE

To familiarize students with Artificial Intelligence techniques for building well-engineered and efficient intelligent systems. Pattern-directed inference systems and different types of truth maintenance systems will be discussed in length from both theoretical and applied point of view. Some cutting edge applications of these systems will also be discussed. Introduction to Artificial Intelligence Programming using LISP will be provided to help students with the programming part of the course.

EXPECTED COURSE OUTCOMES:

CO1 understand the history, development and various applications of artificial intelligence;

CO2 familiarize with propositional and predicate logic and their roles in logic programming;

CO3 learn the knowledge representation and reasoning techniques in rule based systems, case-based systems, and model-based systems;

CO4 appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, techniques based on probability theory and possibility theory (fuzzy logic);

UNIT-I

Introduction: What is AI? , History, Overview, Intelligent Agents, Performance Measure, Rationality, Structure of Agents, Problem-solving agents, Problem Formulation, Uninformed Search Strategies.

UNIT-II

Informed (Heuristic) Search and Exploration, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing, Genetic Algorithms, Online search.

UNIT-III

Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

UNIT-IV

Knowledge Based Agents, Logic, Propositional Logic, Inference, Equivalence, Validity and satisfiability, Resolution, Forward and Backward Chaining, DPLL algorithm, Local search algorithms, First Order Logic, Syntax and Semantics of FOL, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT-V

Planning, Language of planning problems, planning with state space search, partial order planning, planning graphs, planning with propositional logic, Uncertainty, Handing uncertain knowledge, rational decisions, basics of probability, axioms of probability, inference using full joint distributions, independence

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach: Stuart Russel and Peter Norving,
2. Prentice Hall Series in AI.
3. Artificial Intelligence: Winston P.H., Addison Wesley,.
4. Artificial Intelligence: E.Rich and Knight, Tata McGraw Hill.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

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CO1	-	-	-	1	2	-	3	1	1	-	3	-
CO2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	-	-	2	3	1	-	-	-	1	-	-
CO4	-	-	-	3	3	-	2	-	-	-	-	-

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Fourth Semester MCA
(5P2B4F) MANAGEMENT INFORMATION SYSTEMS
(Elective II)

COURSE PREREQUISITES
- Qualified systems and management staff
- Control and maintenance of MIS
- Common data base
- Evolution of MIS
- Support of top management

COURSE OBJECTIVES
Graduates shall be able to
1. Understand the basic working principles of information systems and enterprises
2. Equip the students with preliminaries of technologies used in business information systems
3. Familiarize students with the Business applications
4. Enable the students to build decision support systems
5. Enhance the knowledge of the student about the management Security challenges in IT sector

EXPECTED COURSE OUTCOMES
After going through this course the student will be able to:
CO1: Understand the fundamentals of a computer based information systems and enterprises
CO2: Analyze the technologies associated with business information systems
CO3: Evaluate significance of support systems in enterprises and align to security control measures in IT sector

UNIT I

INTRODUCTION: MIS Definition, Role of MIS, and Impact of the MIS, Management as a Control System, Organization as a System, and MIS for a Digital Firm.
Decision Making: Decision-Making Concepts, Decision-Making Process, Behavioral Concepts in Decision-Making, Organizational Decision-Making.

UNIT II

INFORMATION SYSTEMS IN GLOBAL BUSINESS TODAY: The role of Information System in Business Today, Perspective of Information Systems, Organizations and Strategy: Organizations and Information Systems, How Information Systems Impact Organizations and Business Firms, Using Information Systems to Achieve Competitive Advantage, Porter's Competitive Forces Model.

UNIT III

INFORMATION, KNOWLEDGE, BUSINESS INTELLIGENCE: Information Concept, Classification of Information, Methods of Data and Information Collection, Knowledge Management Systems. Database and Information Management: Organizing Data in Traditional File Environment, The Database Approaches to Data Management, Using Databases to improve Business and Decision Making.
CONCEPTUAL SYSTEM DESIGN: Define the Problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual design report.

UNIT IV

PITFALLS IN MIS DEVELOPMENT: Fundamental weaknesses, soft spots in planning, design problems, Introduction to E-Commerce and E-Commerce challenges, Security and ethical issues of information system.

UNIT V

ENHANCING DECISION MAKING: Systems for Decision Support, Executive Support Systems, Growth of International Information Systems, Organizing International Information Systems, Managing Global Systems, Technology Issues and Opportunities for Global Value Chains.

TEXT BOOKS
1. R.G. Murdick, J.E Ross and J.R clagget. Information Systems for Modern Management. PHI, 1994,3rd Ed,.
2. Kenneth C. Laudon, Jane P. Laudon. Management Information Systems, Managing the Digital Firm, Pearson Education, 2010, 11th Ed.

REFERENCES
1. Waman S Jawadekar. Management Information Systems Text and Cases, MGH, Jun 2009.
2. Robert schultberis, Mary sumner. Management information systems. PHI,1999
3. C.S.V Murthy. Management information systems text and applications,.HPH, 2011, 3rd Edreprint.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

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CO2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	-	-	2	3	1	-	-	-	1	-	-
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Fourth Semester MCA

(5P2B47) SOFTWARE ENGINEERING LAB

1. Case Study 1: Library Case Study
2. Case Study 2: Retail Domain
3. Case Study 3: Bank Domain
4. Case Study 4: Insurance Domain
5. Case Study 5: Any Internet Application

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Fourth Semester MCA

(5P2B48) WEB TECHNOLOGIES LAB

1. Develop static pages of an online Bookstore. The pages should resemble www.amazon.com. The website should consist the following pages
   - Home Page
   - Registration Page
   - Login Page
   - Books Catalogue
   - Shopping Cart
   - Payment By Credit Card
   - Order Confirmation

2. Design a web page using Cascading Style Sheet
3. Validate the Registration, user login, user profile, and payment by credit card pages using JavaScript
4. Create and save an XML document at the server, which contains 10 users information. Write a program which takes User ID as input and returns the user details by taking the user information from the XML document
5. Write XML file which will display the Book information which includes 1) Title of the Book 2)Author Name 3)ISBN Number 4) Publisher Name 5) Edition 6) Price
6. Write a simple Document Object Model program to create XML document.
7. Write a simple XSLT Program to display XML data in HTML document
8. Write a simple bean program for generating the traffic signal
9. Install Tomcat Web Server on port 8080. Convert the above created static web pages into dynamic web pages using servlets.
10. Assume four users user1, user2, user3 and user4 having passwords- pwd1, pwd2, pwd3 and pwd4 respectively. Write a Servlet for doing the following:
    a) Create a cookie and add these four user ids and passwords to the cookie
    b) Read the user id and password entered in the Login form and authenticate with the value available in the cookies. If he is a valid user you should welcome him/her by the name else you should display "You are not an authorized User". Use init-parameters to do this.
11. Install database MySql. Create a table which should contain at least the following fields such as name, password, email-id, phone number. Write a JSP program to connect to database and extract data from tables and display them. Insert the details of the users who register with web site whenever new user clicks the submit button in the registration page.
12. Develop a JSP page for news channel to conduct opinion poll on any topic. Users will respond through yes/no answers. Later display the results in percentages.
13. Create tables in database which contain the details of book such as book name, price, quantity, and amount, Modify the catalogue page in such a way that you should connect to database and extract data from tables and display them in catalogue page using JDBC.

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Fourth Semester MCA

(5P2B49) DATA WAREHOUSING AND MINING LAB

The objective of the lab exercises is to use data mining techniques to identify customer segments and understand their buying behavior and to use standard databases available to understand DM processes using WEKA (or any other DM tool)

1. Perform credit risk assessment Task using WEKA Tool.
2. Build Multidimensional data models for Hospital Management System.
3. Implement the following Multidimensional Data Models
    i. Star Schema
    ii. Snowflake Schema
    iii.Fact Constellation

4. Implement Apriori algorithm to generate frequent Item Sets

5. Implement the following clustering algorithms

    i. K-means
    ii. K-mediods

6. Implement the following classification algorithms
    i. Decision Tree Induction
    ii. KNN
7. Perform data Preprocessing using WEKA
8. Perform Discretization of data using WEKA
9. Classification algorithms using WEKA
10. Apriori algorithm using WEKA
11. Perform data transformations using an ETL Tool
12. A small case study involving all stages of KDD. (Datasets are available online like UCI Repository etc.)

Fifth Semester MCA

(5P2B51) RESEARCH METHODOLOGY

COURSE PREREQUISITES: All Core Courses

COURSE OBJECTIVE
1. To develop understanding of the basic framework of research process.
2. To develop an understanding of various research designs and techniques.
3. To identify various sources of information for literature review and data collection.
4. To develop an understanding of the ethical dimensions of conducting applied research.
5. Appreciate the components of scholarly writing and evaluate its quality.

EXPECTED COURSE OUTCOMES
1. Identify different research methods and their theoretical underpinnings.
2. Demonstrate an ability to identify, analyse and synthesise literature related to a research question.
3. Critically analyse and demonstrate an ability to formulate viable research questions.
4. Demonstrate skills in using online data bases and software.
5. Demonstrate high level written and verbal communication skills.

UNIT I

INTRODUCTION TO RESEARCH
The hallmarks of scientific research – Building blocks of science in research – Concept of Applied and Basic research – Quantitative and Qualitative Research Techniques – Need for theoretical frame work – Hypothesis development – Hypothesis testing with quantitative data. Research design – Purpose of the study: Exploratory, Descriptive, Hypothesis Testing.

UNIT II

EXPERIMENTAL DESIGN - Laboratory and the Field Experiment – Internal and External Validity – Factors affecting internal validity, Measurement of variables – Scales and measurements of variables, Developing scales – Rating scale and attitudinal scales – Validity testing of scales –Reliability concept in scales being developed – Stability Measures.

UNIT III

METHODS OF DATA COLLECTION: Interviewing, Questionnaires, etc. Secondary sources of data collection, Guidelines for Questionnaire Design – Electronic Questionnaire Design and Surveys, Special Data Sources: Focus Groups, Static and Dynamic panels. Review of Advantages and Disadvantages of various Data-Collection Methods and their utility. Sampling Techniques – Probabilistic and non-probabilistic samples, Issues of Precision and Confidence in determining Sample Size

UNIT IV

MULTIVARIATE STATISTICAL TECHNIQUES
Data Analysis – Factor Analysis – Cluster Analysis – Discriminant Analysis – Multiple Regression and Correlation – Canonical Correlation – Application of Statistical Software Package in Research

UNIT V

RESEARCH REPORT - Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing, – Recommendations and Implementation section – Conclusions and Scope for future work

CASE STUDY - Presentation by students on their area of research.

TEXT BOOKS
1. Kothari, C.R., "Research Methodology: Methods and Techniques", 2nd Edition, New Age International, New Delhi, 2012.
2. Nicholas Walliman, "Your Research Project", 2nd Edition, Vistaar Publication, New Delhi, 2005.
3. Donald R. Cooper and Pamela S. Schindler, Business Research methods, 9th Edition, Tata Mc Graw Hill, 2006.

REFERENCES
1. Taha H.A., "Operations Research: An Introduction", 7th Edition, Pearson Education Edition, Asia, New Delhi, 2002.
2. Richard A. Johnson, "Miller and Freund's Probability and Statistics for Engineers", 8th Edition, Pearson Education, Asia, 2011.
3. Alan Bryman and Emma Bell, Business Research methods, Oxford University Press, New Delhi, 2008.

MODE OF EVALUATION
   Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	-	-	-	-	1	-	-	1	1	-
2	3	3	-	2	2	-	2	-	-	-	-	-
3	2	2	1	-	1	-	1	-	1	3	-	-
4	2	2	-	-	-	-	3	2	-	-	2	-
5	3	3	-	-	3	-	1	-	-	-	-	-

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Fifth Semester MCA

(5P2B52) .NET TECHNOLOGIES

COURSE PREREQUISITES

- As .Net can be used in development for both desktop as well as web applications, first you need to start from C language.
- Understanding/ Graduation with knowledge of any programming language.

COURSE OBJECTIVE

- Design and Develop professional console and window based .NET application.
- Construct classes, methods and assessors and instantiate objects.
- Create and manipulate GUI components in C#.
- Design and Implement database connectivity using ADO.NET in window based application.
- Identify industry defined problem and suggesting solution(s) using .NET applications.

EXPECTED COURSE OUTCOMES

- Understand, analyze and explain .NET Framework and C#.
- Understand, analyze and use basic C# constructs, delegates and events and use language interfaces, and inheritance.
- Understand, analyze and exposed to the Common Language Runtime (CLR), garbage collection, and assemblies.
- Understand, analyze and use exceptions, Windows Forms, .NET Remoting and Serialization.
- Build interactive web applications using ASP.NET and C#.

UNIT I

INRODUCTION TO .NET FRAMEWORK: .NET Overview- Behind Microsoft .NET- The .NET Platform-.NET Framework Design Goals- .NET Framework- Common Language Runtime –CLR Environments and Executables-Metadata-JIT Compilation-Automatic Memory Management-Assemblies and Manifests-Intermediate Language(IL)- CTS and CLS- CLR Execution.

UNIT II

INTRODUCTION TO C# .NET PROGRAMMING: A Demonstration of Visual C#- Common Elements in Visual C- C# Core Language Features- Types- Classes- Structures- Enumeration- Inheritance- Interfaces- Polymorphism- Arrays and Collections- Generics- Operator Overloading- Delegates and Events- Introduction to LINQ Programming- Exception Handling- MSIL Programming.

UNIT III

APPLICATION DEVELOPMENT USING ADO .NET: Features of ADO .NET- Architecture of ADO .NET- ADO .NET Providers- Accessing Database using ADO .NET- Connection Opening and Closing- Command Object- Data Adapter- Dataset- Data Tables- Controlling table views with Data Views and Data Relation Objects- Data-binding in Windows Forms and Web Forms.

UNIT IV

INTRODUCTION TO ASP.NET: **Introduction- Working in ASP.NET Controls-** Session and Cookies- Caching- Authentication and Authorization-Web User Controls- Working with Web Config file- Implementing Security- Crystal Reports-Creating Setup and Deployment.

UNIT V

WEB SERVICES: Introduction to Web Services- Web Services Protocol and Standards- WSDL-Overview of UDDI- Calling a Web Service from a Browser- Calling a Web Service by using a proxy- Creating a Simple Web Service-AJAX

TEXT BOOKS
1. Thuan L. Thai. .NET Framework Essentials. O'Reilly, 2003, 3rd Ed.
2. Donis Marshall. Programming Microsoft Visual C# 2008. Microsoft Press 2008.
3. Francesco Balena. Programming Microsoft Visual Basic .NET. Microsoft Press 2006.

REFERENCE BOOKS
1. Rebecca M. Riordan. Microsoft ADO.NET Step by Step. Microsoft Press   2002.
2. Kogent, ASP.NET 3.5 Black Book, Dream Tech Publications, 2010.
3. Andy Wigley, Peter Roxburgh. Building Microsoft ASP.NET Applications for Mobile Devices. Microsoft Press 2003, 2nd Ed.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

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CO1	3	3	3	-	3	3	3	-	3	-	3	-
CO2	2	3	3	-	3	2	3	-	3	-	3	-
CO3	3	3	3	-	3	2	3	-	3	-	3	-
CO4	2	3	3	-	3	1	3	-	3	-	3	-
CO5	1	2	2	-	1	1	3	-	1	-	2	-

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Fifth Semester MCA

(5P2B53) Object Oriented Modeling and Design with UML

COURSE PREREQUISITES: The object-oriented concepts

COURSE OBJECTIVE
1. Specify, analyze and design the use case driven requirements for a particular system.
2. Model the event driven state of object and transform them into implementation specific layouts.
3. Identify, Analyze the subsystems, various components and collaborate them interchangeably

EXPECTED COURSE OUTCOMES
CO1. Analyze, design, document the requirements through use case driven approach.
CO2. Identify analyses, and model structural and behavioral concepts of the system.
CO3. Develop explore the conceptual model into various scenarios and applications.
CO4. Apply the concepts of architectural design for deploying the code for software.

UNIT I

INTRODUCTION: Object Orientation, importance of modeling, principles of modeling, UML architecture and Conceptual model of UML.

UNIT II

Structural Modeling: Classes, Relationships, Common Mechanisms, Advanced classes, advanced relationships, Interfaces, Packages, modeling Class and Object Diagrams

UNIT III

BEHAVIORAL MODELING: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Collaborations and Activity Diagrams.

UNIT IV

ADVANCED BEHAVIORAL MODELING: Events and signals, state machines, processes and Threads, time and space, state chart diagrams

UNIT V

ARCHITECTURAL MODELING: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson. The Unified Modeling Language User Guide. Pearson Education.1998.
2. Michael Blaha and James Rumbaugh. Object Oriented Modeling and Design with UML, 2005.

REFERENCE BOOKS

1. Craig Larman. Appling UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process. Pearson Education, 2008.
2. Bernd Oestereich. Developing software with UML- Addision-Wesley, June 2002.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado. UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.2004.

MODE OF EVALUATION

Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO2	-	-	-	-	-	-	-	2	-	-	1	-
CO3	-	-	-	-	3	1	-	-	-	1	-	-
CO4	-	-	-	-	3	-	2	3	-	-	-	-

Correlation Level 1,2 or 3 as defined below:

1:Slight(Low), 2:Moderate(Medium), 3:Substantial(High), If there is no correlation, put " –"

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Fifth Semester MCA

(5P2B54) OPEN SOURCE SOFTWARE

COURSE PREREQUISITES: Network programming

COURSE OBJECTIVE

The objective of this course is to introduce concepts, principles and applications of open source software. Discuss about open source software development process. Cover economy business, and societal and intellectual property aspects of open source software.

EXPECTED COURSE OUTCOMES
   CO1: Understand concepts, strategies, and methodologies related to open source
        software development
   CO2: Understand the business, economy, societal and intellectual property issues of
        open source software
   CO3: Be familiar with open source software products and development tools
        currently available on the market
   CO4: Be able to utilize open source software for developing a variety of software
        applications, particularly Web applications

UNIT - I

Open Source Software: Definitions & History- Definitions of terms, A Brief History of Software Where Open Source Is Successful –Analytical Framework, Open Source in widespread successful use, Examples of Open Source Systems; Open Source: The Good, the Bad, and the Ugly-What is Good about Open source, Open Source is Not enough by itself, How Choosing Open Source Is More difficult for You, What Others Say about Open Source.

UNIT – II

Five Open Source Opportunities – Introduction, Directory Services, Email, Groupware and Collaboration, Complex Web Publishing, Manage User Desktops, Other Possibilities Operating Systems – Contents of the Operating systems, Linux Distribution Vendors, Enterprise Distribution Vendors, Community-Supported Distribution Vendors, International Alternatives

UNIT - III

Open Source Server Applications – Infrastructure Services, Web Services, Database Servers, Mail Servers, System Management Open Source Desktop Applications – Introduction, Graphical Desktops, Web Browsers, The Office Suite, Mail and Calendar Clients, Personal Software

UNIT - IV
How Open Source Software is Developed – Methodology, Languages Used to Develop Open source Products, Cross-Platform Code Application Architecture –Types of Systems, Tiered Design, Managing Performance and Scalability, Interoperability, Development Platform Choices

UNIT - V

Managing System Implementations – Implementation Roles, Open Source Impact on Team Issues, Implementation Process, Implementations Principles, Key Documents, Migration, Interacting with Open Source Community, Support; The Cost of Open Source Systems- Total Cost of Ownership, Types of Costs, Scenarios Licensing – Types of Licenses, Licenses in Use, Mixing Open and Closed Code, Dual Licensing, Other Intellectual Property Issues

TEXTBOOK

1. Open Source Software Implementation and Management, Paul Kavanagh, Elsevier Digital Press.
2. Understanding Open Source Software Development, Joseph Feller and Brian Fitzgerald, Addison Wesley Professional 2002.
3. Producing Open Source Software, Karl Fogel, O'reilly-2006.

MODE OF EVALUATION

Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	1	-	-	-	-	-	2	-	2	1
CO3	1	-	-	-	-	-	-	-	-	1	-	1
CO4	2	-	2	-	-	-	-	-	2	1	1	2

Correlation Levels 1,2 or 3 as defined below:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

Fifth Semester MCA

(5P2B5A) BIG DATA
(Elective III)

COURSE PREREQUISITES: Database systems

COURSE OBJECTIVE
1. Introduce students the concept and challenge of big data (3 V's:volume, velocity, and variety).
2. Teach students in applying skills and tools to manage and analyze the big data.

EXPECTED COURSE OUTCOMES:
CO1 : Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data;
CO2 : Know how to collect, manage, store, query, and analyze various form of big data.
CO3: Gain knowledge on large-scale analytics tools like Hadoop to solve some open big data problems
CO4: Understand the impact of big data for business decisions and strategy.

UNIT I

INTRODUCTION TO BIG DATA : Big Data and its Importance – Four V's of Big Data – Drivers for Big Data –Introduction to Big Data Analytics – Big Data Analytics applications.

UNIT II

BIG DATA TECHNOLOGIES : Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management

UNIT III

PROCESSING BIG DATA: Integrating disparate data stores - Mapping data to the programming framework Connecting and extracting data from storage - Transforming data for Processing - Subdividing data in preparation for Hadoop Map Reduce.

UNIT IV

HADOOP MAPREDUCE: Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

UNIT V

ADVANCED ANALYTICS PLATFORM: Real-Time Architecture – Orchestration and Synthesis Using Analytics Engines– Discovery using Data at Rest – Implementation of Big Data Analytics – Big Data Convergence – Analytics Business Maturity Model

TEXT BOOKS
1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: EmergingBusiness Intelligence and Analytic Trends for Today's Business", 1st Edition,Ambiga Dhiraj, Wiely CIO Series, 2013.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing theGame", 1st Edition, IBM Corporation, 2012.

REFERENCES
1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	-	-	-	-	-	-	2	-	2	1
CO3	1	-	-	-	-	-	-	-	-	1	-	1
CO4	-	-	-	-	-	-	-	-	2	1	1	2

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Fifth Semester MCA

(5P2B5B) SOFT COMPUTING
(Elective III)

COURSE PREREQUISITES
- Algorithms Design and Analysis
- Theory of Computation

COURSE OBJECTIVE

The development of new reasoning and decision making tools that can deal with uncertainty and imprecision leads to considerable scientific and technical progress. This training school will bring different approaches, research lines and applications together and will permit the trainees to explore synergies between different computational and mathematical methods, to structure promising new ideas and research projects, to develop new research lines, to generate scientific and technical knowledge and to increase the multidisciplinary of European researchers. The training school plan will balance topics from basic research lines and real-world applications.

EXPECTED COURSE OUTCOMES:

CO1: Can understand the principles of software engineering.
CO2: Can understand and use of software engineering terminology and nomenclature

UNIT I

INTRODUCTION TO SOFT COMPUTING: Evolution of Computing – Soft Computing Constituents – From Conventional AI to Computational Intelligence – Machine Learning Basics.

UNIT II

GENETIC ALGORITHMS : Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III

NEURAL NETWORKS : Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks – Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.

UNIT IV

FUZZY LOGIC: Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions – Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT V

NEURO – FUZZY MODELING : Adaptive Neuro – Fuzzy Inference Systems – Coactive Neuro – Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro – Fuzzy Control – Case Studies

TEXT BOOKS
1. Jyh – Shing Roger Jang, Chuen – Tsai Sun, Eiji Mizutani, "Neuro – Fuzzy and Soft Computing", Prentice – Hall of India, 2003
2. Kwang H.Lee, "First course on Fuzzy Theory and Applications", Springer – Verlag Berlin Heidelberg, 2005.
3. S.Rajasekaran and G.A.V.Pai. Neural Networks, Fuzzy Logic and Genetic Algorithms. PHI.2003.

REFERENCE BOOKS
1. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic – Theory and Applications", Prentice Hall, 1995.
2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 2007.
4. Mitsuo Gen and Runwei Cheng, "Genetic Algorithms and Engineering Optimization", Wiley Publishers 2000.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	-	-	-
CO2	1	-	1	-	-	-	-	-	-	-	2	1

Correlation Levels 1,2 or 3 as defined below:
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Fifth Semester MCA

(5P2B5C) SOFTWARE ARCHITECTURE

(Elective III)

COURSE PREREQUISITES: Software Engineering

COURSE OBJECTIVE
- The objective of the course is to introduce the fundamentals of software architecture.
- Software architecture and quality requirements of a software system.
- Fundamental principles and guidelines for software architecture design,   architectural styles, patterns and frameworks.

EXPECTED COURSE OUTCOMES:

CO1: Argue the importance and role of software architecture in large- scale software systems
CO2: Design and motivate software architecture for large-scale software systems
CO3: Recognize major software architectural styles, design patterns, and frameworks
CO4: Describe a software architecture using various documentation approaches and architectural description languages

UNIT I

INTRODUCTION TO SOFTWARE ARCHITECTURE: An Engineering Discipline for Software, Status of Software Architecture, Architecture Business Cycle, Importance of Architectures, Software Processes and the Architecture Business Cycle, Features of Good Architecture.

UNIT II

ARCHITECTURE STYLES: Pipes and Filters, Data Abstraction and Object Oriented organization, Even-based Implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control, Heterogeneous Architectures.
Formal models and Specifications: Formalizing the Architectural of a Specific System, Architectural Style, and Architectural Design Space.

UNIT III

SHARED INFORMATION SYSTEMS: Database Integration, Interpretation in Software Development Environments, Architectural Structures for Shared Information Systems

UNIT IV

ARCHITECTURAL PATTERNS: Structured Patterns, Patterns for Distribution, and Patterns for Interactive Systems.

UNIT V

ARCHITECTURAL DESCRIPTION LANGUAGES: Capturing Architectural Information in an ADL, Application of ADL's in system Development, Example of ADL.

TEXT BOOKS
1. Mary Shaw, David Garlan. "S/W Arch. Perspective: on an Emerging Discipline". PHI, 1996.
2. Len Bass, Paul Elements, Rick Kazman. Software Architecture in Practice. PEA, 1998.

REFERENCE BOOKS
1. Buschmann. Pattern Oriented Software Architecture. Wiley, 1996.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	-	-	-
CO2	1	-	1	-	-	-	-	-	-	-	2	1
CO3	1	1	-	-	-	-	-	-	-	-	-	1
CO4	2	-	2	1	2	-	-	-	-	-	1	2

Correlation Levels 1,2 or 3 as defined below:
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Fifth Semester MCA
(5P2B5D) SOFTWARE TESTING METHODOLOGIES
(Elective – IV)

COURSE PREREQUISITES
- Student must have a real world problem understanding , identifying knowledge of software testing methods

COURSE OBJECTIVE
1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.

EXPECTED COURSE OUTCOMES:
CO1. Know the basic concepts of software testing and its essentials.
CO2. Able to identify the various bugs and correcting them after knowing the consequences of the bug.
CO3.Use of program's control flow as a structural model is the corner stone of testing.
C04. Performing functional testing using control flow and transaction flow graphs.
CO5.Able to test a domain or an application and identifying the nice and ugly domains

UNIT I

INTRODUCTION: Purpose of testing, Dichotomies, Model for testing, Consequences of bugs, Taxonomy of bugs.

UNIT II

FLOW GRAPHS AND PATH TESTING: Basic Concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing, TRANSACTION FLOW TESTING: Transaction flows, transaction flow testing techniques. Data Flow Testing: Basics of Dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT III

DOMAIN TESTING: domains and paths, Nice and Ugly domains, domain testing, domains and interface testing, domains and testability.

UNIT IV

PATH,PATH PRODUCTS AND REGULAR EXPRESSIONS: path products and path expressions, Reduction procedure and Applications, LOGIC BASED TESTING: Overview, decision tables, path expressions.

UNIT V

STATE, STATE GRAPHS AND TRANSITION TESTING: State graphs, good and bad state graphs, state testing - GRAPH MATRICES AND APPLICATION: Matrix of graph, relations, powers of a matrix, node reduction algorithm, Building tools.

TEXT BOOKS
1. Boris Beizer. Software testing techniques. Dreamtech, 2009, 2nd Ed.

REFERENCE BOOKS
1. Edward kit. Software testing in the real world. Addison-Wesley professional, July 1995.
2. Dr.K.V.K.K.Prasad. Software Testing Tools. Dreamtech press, New Delhi, 2007, Reviewed

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	1	1	-	-	-	1	-	-	1
CO2		-	-	2	2	-	1	-	2	-	-	-
CO3	1	-	-	3	-	-	3	-	-	2	-	3
CO4	-	-	-	1	-	-	-	-	1	-	-	2
CO5	1	-	-	-	2	-	-	2	-	1	-	3

Correlation Levels 1,2 or 3 as defined below:
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Fifth Semester MCA

(5P2B5E) INFORMATION SECURITY
(Elective – IV)

COURSE PREREQUISITES
- Student must have a basic knowledge of how to apply System security techniques
- Different types of attacks and how to overcome those attacks from hackers

COURSE OBJECTIVE
1. To explore a comprehensive study of the principles and practices of computer system security
2. To continually strengthen and improve the overall capabilities of the information security management system
3. To increase professional skills in terms of information security management and technology
4. To establish quantified information security goals annually through management and review meetings

EXPECTED COURSE OUTCOMES
1. To strengthen internal control and prevent unauthorized and improper access to data, thereby ensuring the appropriate protection of information assets
2. To appropriately protect the confidentiality and integrity of information assets
3. To ensure that information is not revealed to unauthorized third parties during the process of transmission or as a result of unintentional actions
4. To ensure that all information security accidents or suspected security flaws have appropriate reporting mechanisms so that superiors are notified and these incidents are appropriately investigated and handled

UNIT I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs

UNIT II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III

Public key cryptography principles, public key cryptography algorithms, digital signatures, Kerberos, X.509 Directory Authentication Service, EMAIL PRIVACY: Pretty Good Privacy (PGP) and S/MIME.

UNIT IV

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

UNIT V

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems

TEXT BOOKS

1. William Stallings. Network Security Essentials (Applications and Standards). Pearson Education.
2. Bruce Schneier. Applied Cryptography. Toha Wiley and Sons, 1996, 2nd Ed.
3. Stallings. Cryptography and Network Security - Principles and Practice. Prentice Hall, 2002, 3rd Ed.

REFERENCE BOOKS

1. Eric Maiwald. Fundamentals of Network Security. Dreamtech press, 2003.
2. Charlie Kaufman, Radia Perlman and Mike Speciner. Network Security - Private Communication in a Public World. Pearson/PHI, 2002.
3. Whitman. Principles of Information Security. Thomson, 2008, 3rd Ed.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	1	-	1	-	1	-	-	1
CO2		2	1	2	2	-	1	-	1	-	1	-
CO3	1	2	1	3	-	1	1	-	-	2	-	3
CO4	-	2	-	1	-	1	1	-	1	-	-	2

Correlation Levels 1,2 or 3 as defined below:
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Fifth Semester MCA

(5P2B5F) MOBILE APPLICATION DEVELOPMENT
(Elective IV)

COURSE PREREQUISITES
- Student must know about the different operating system in mobile
- Basic knowledge of hardware and software of the mobiles

COURSE OBJECTIVE
- Learning about mobile devices types
- Learning about modern mobile operating systems
- Learning about data transmission standards
- Learning about systems for mobile application distribution
- Preparing for mobile application development

EXPECTED COURSE OUTCOMES:
CO1:Student knows mobile devices and mobile platforms
CO2:Student has knowledge concerning mobile operating systems and their architecture
CO3: Student is familiar with wireless communications standards and data transmission standards
CO4: Student knows how to prepare a mobile application for distribution

UNIT I

Introduction: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features.

Unit II

Introduction to Mobile development IDE's, Introduction to Work light basics, Optimization, pages and fragments , Writing a basic program- in Work light Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Work light Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova, Offline access, Encrypted cache deprecated, Using JSON Store

Unit III

Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Work light Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization, Web View overlay, Creating Authentication application: development for Apple iOS by using a login module, Device Analytics, Work light Server Administration

UNIT IV

Windows Phone: Introduction to Windows Phone, Architecture, memory management, communication protocols, application development methods, deployment, WorkLight, Kendo, Appcon, Xcode, Xpages ; Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment.
Case Study: Design and development of Application using mobile application development platforms e.g. Worklight, Kendo, Appcon, Xcode, Xpages

UNIT V

IOS: Introduction to IOS, Architecture, memory management, communication protocols, application development methods, deployment.
Case Study: Design and development of Application using mobile application development platforms e.g. Work Light, Kendo, Appcon, Xcode, Xpages

TEXT BOOKS
1. Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development" Edition: I
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I
4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS

REFERENCES
1. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley &Sons
2. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
3. Jochen Schiller,"Mobile Communications", Addison-Wesley, 2nd edition, 2004.
4. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley,
5. 2002, ISBN 0471419028.

MODE OF EVALUATION
Internal Assessment (40 %) and Term End Examination (60%)

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	2	-	-	1
CO2		-	1	2	2	-	-	-	3	-	1	-
CO3	1	-	3	3	-	1	-	-	-	2	-	3
CO4	-	-	-	1	-	1	-	-	1	-	-	2

Correlation Levels 1,2 or 3 as defined below:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), if there is no correlation, put "-".

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Fifth Semester MCA

(5P2B57) .NET TECHNOLOGIES LAB

1. Write a simple program in c# to write a string on the screen
2. Write a program in C# to prompt the user for some input and then take some action
3. Write a program in C# to demonstrate different kinds of arrays including jagged arrays.
4. Write a program to demonstrate boxing
5. Write a program in C# to override a method which calculates pay of employees to take bonus into account.
6. Write a Program to implement an Interface
7. Write a program in C# to create a base class shape and derived classes i.e., Rectangle, Circle, and Triangle. Invoke the method from base class shape using polymorphism.
8. Develop a database application to store the details of students using ADO.NET.
9. Create a simple ASP.NET page to Output Text with a form, two HTML text boxes an HTML button, and an HTML <span> element. Create an event procedure for the button.
10. Create a application for Accessing a SQL Database by Using ADO.NET by connecting to the SQL Server database and call a stored procedure. You then display the data in a Repeater control.
11. Write a program that displays a button in green color and it should change into yellow when the mouse moves over it.
12. Write a program containing the following controls:
    - A ListBox
    - A Button
    - An Image
    - A Label
13. The listbox is used to list items available in a store. When the user clicks on an item in the listbox, its image is displayed in the image control. When the user clicks the button, the cost of the selected item is displayed in the control.
14. Create a Form that receives the user name, address, date, nationality, country preferred for working and skill sets from the user and stores the user name in the client using cookies. The country preferred data should appear in a drop down list whereas; others should be entered in a textbox. Validate all the controls. The Form is named "formexp.aspx". The date should appear between "1/1/1900" and "1/1/2090".

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Fifth Semester MCA

(5P2B58) UML LAB

Select 5 Projects from the following and design UML Diagrams

1. Online Library System
2. Airlines Reservation System
3. ATM Model
4. Online Gas Booking System
5. Personal Computer Model
6. Point Of Sale
7. Simulated Company
8. Student Model

REFERENCES:

1. Bernd Oestereich. Developing software with UML. Addision-Wesley, June 2002.
2. Mark Priestley. Practical Object-Oriented Design with UML. Tata Mc-Graw Hill, 2005.
3. Craig Larman. Appling UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process. Pearson Education, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado. UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.2004.

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Fifth Semester MCA

(5P2B59) SOFTWARE DEVELOPMENT LAB

Develop Software using CASE tools for the applications like:

1. Online Railway Reservation System
2. Payroll processing application
3. Inventory system
4. Automating the banking process
5. Software for game
6. Library management system
7. Create a dictionary
8. Text editor
9. Telephone directory
10. Create an E-Book of your choice

Software Required:

1. Languages: C/C++/Java/JSDK/Web browser.
2. Any Front end tool: (like VB, VC++, Developer 2000) etc
3. Any Backend tool: (Oracle, Ms-Access, SQL) etc.
4. Any CASE tool