

# **GITAM UNIVERSITY**

(Estd. U/S 3 of UGC Act 1956)



**Revised Syllabus of  
Master of Computer Applications (M.C.A.)  
(w.e.f. 2012-13 Admitted Batch)**

**DEPARTMENT OF COMPUTER SCIENCE  
GITAM INSTITUTE OF SCIENCE  
GITAM UNIVERSITY**

Gandhi Nagar Campus, Rushikonda  
Visakhapatnam-530 045, A.P., India

[Website: www.gitam.edu](http://www.gitam.edu)

# REGULATIONS

(w.e.f. 2012-13 admitted batch)

## 1.0 ADMISSIONS

- 1.1 Admissions into Master of Computer Applications (MCA) programme of GITAM University are governed by GITAM University admission regulations.

## 2.0 ELIGIBILITY CRITERIA

- 2.1 A pass in any Degree with 50% Marks and Mathematics at +2 level or Degree level or equivalent examination.
- 2.2 Admissions into M.C.A. will be based on the following:
- (i) Score obtained in GAT (PG), if conducted.
  - (ii) Performance in Qualifying Examination/Interview.

The actual weightage to be given to the above items will be decided by the authorities before the commencement of the academic year.

## 3.0 STRUCTURE OF THE M.C.A. PROGRAMME

- 3.1 The Programme of instruction consists of:
- (i) A core programme imparting to the student specialization of computer applications.
  - (ii) An elective programme enabling the students to take up a group of courses of interest to him/her.
  - (iii) Carry out a technical project approved by the Department and submit a report.
- 3.2 Each academic year consists of two semesters. The M.C.A. programme has a curriculum and course content (syllabi) recommended by the Board of Studies concerned and approved by Academic Council.
- 3.3 Project Dissertation has to be submitted by each student individually.

## 4.0 CREDIT BASED SYSTEM

- 4.1 The course content of individual courses - theory as well as practicals – is expressed in terms of a specified number of credits. The number of credits assigned to a course depends on the number of contact hours (lectures & tutorials) per week.
- 4.2 In general, credits are assigned to the courses based on the following contact hours per week per semester.
- One credit for each Lecture/Tutorial hour.  
Two credits for three (or more) hours of Practicals.  
Three credits for three (or more) hours of practicals that require theory support with one Lecture hour.
- 4.3 The curriculum of M.C.A. programme is designed to have a total of 153 credits for the award of M.C.A. degree. A student is deemed to have successfully completed a particular semester's programme of study when he / she earns all the credits of that semester i.e., he / she has no 'F' grade in any course of that semester.

## 5.0 MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

## 6.0 REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the College / University.

## 7.0 CONTINUOUS ASSESSMENT AND EXAMINATIONS

7.1 The assessment of the student's performance in each course will be based on continuous internal evaluation and semester-end examination. The marks for each of the component of assessment are fixed as shown in the Table 1.

**Table 1: Assessment Procedure**

S.No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory	40	Continuous evaluation	(i) Two mid semester examinations shall be conducted for 10 marks each. (ii) Two quizzes shall be conducted for 5 marks each. (iii) 5 marks are allotted for assignments. (iv) 5 marks are allotted for attendance
		60	Semester-end examination	The semester-end examination in theory courses will be for a maximum of 60 marks.
	Total	100		
2	Practicals	100	Continuous evaluation	(i) 40 marks are allotted for record work and regular performance of the student in the lab. (ii) One examination for a maximum of 20 marks shall be conducted by the teacher handling the lab course at the middle of the semester (iii) One examination for a maximum of 40 marks shall be conducted at the end of the semester (as scheduled by the Head of the Department concerned).
3	Minor Project work	100	Minor Project evaluation	(i) 50 marks are allotted for continuous evaluation of the Minor project work throughout the semester by the guide. (ii) 50 marks are allotted for the presentation of the Minor project work & viva-voce at the end of the semester.*
4	Industrial Training	100	Industrial Training Evaluation	100 marks are allotted for the submission of Training report done at the industry
5	Project work	100	Project evaluation	(i) 50 marks are allotted for continuous evaluation of the project work throughout the semester by the guide. (ii) 50 marks are allotted for the presentation of the project work & viva-voce at the end of the semester.*
6	Comprehensive Viva	100 (Each semester 20 marks- 20 *5 = 100)	Viva-voce	100 marks are allotted for comprehensive viva to be conducted at the end of every semester. * (I semester to V semester )

\* Head of the Department concerned shall appoint two examiners for conduct of the examination.

## 8.0 REAPPEARANCE

- 8.1 A Student who has secured 'F' Grade in any theory course / Practicals of any semester shall have to reappear for the semester end examination of that course / Practicals along with his / her juniors.
- 8.2 A student who has secured 'F' Grade in Project work shall have to improve his report and reappear for viva – voce Examination of project work at the time of special examination to be conducted in the summer vacation after the last academic year.

## 9.0 SPECIAL EXAMINATION

- 9.1 A student who has completed the stipulated period of study for the degree programme concerned and still having failure grade ('F') in not more than 5 courses ( Theory / Practicals), may be permitted to appear for the special examination, which shall be conducted in the summer vacation at the end of the last academic year.
- 9.2 A student having 'F' Grade in more than 5 courses (Theory/practicals) shall not be permitted to appear for the special examination.

## 10.0 ATTENDANCE REQUIREMENTS

- 10.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He /She has to repeat the semester along with his / her juniors.
- 10.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the University College / Institute may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine medical grounds and on payment of prescribed fee.

## 11.0 GRADING SYSTEM

- 11.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

**Table 2: Grades & Grade Points**

Grade	Grade points	Absolute Marks
O	10	90 and above
A+	9	80 – 89
A	8	70 – 79
B+	7	60 – 69
B	6	50 – 59
C	5	40 – 49
F	Failed, 0	Less than 40

- 11.2 A student who earns a minimum of 5 grade points (C grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. However, a minimum of 24 marks is to be secured at the semester end examination of theory courses in order to pass in the theory course.

## 12.0 GRADE POINT AVERAGE

12.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$\text{GPA} = \frac{\sum [ C \times G ]}{\sum C}$$

Where

C = number of credits for the course,  
G = grade points obtained by the student in the course.

12.2 Semester Grade Point Average (SGPA) is awarded to those candidates who pass in all the courses of the semester.

12.3 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time.

12.4 The requirement of CGPA for a student to be declared to have passed on successful completion of the M C A programme and for the declaration of the class is as shown in Table 3.

**Table 3: CGPA required for award of Degree**

<b>Distinction</b>	<b>≥ 8.0*</b>
<b>First Class</b>	<b>≥ 7.0</b>
<b>Second Class</b>	<b>≥ 6.0</b>
<b>Pass</b>	<b>≥ 5.0</b>

\* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester in **first attempt**.

## 13.0 ELIGIBILITY FOR AWARD OF THE MASTER OF COMPUTER APPLICATIONS (M.C.A.) DEGREE

13.1 **Duration of the programme:**

A student is ordinarily expected to complete the M.C.A. programme in six semesters of three years. However a student may complete the programme in not more than five years including study period.

13.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

13.3 Project dissertation shall be submitted on or before the last day of the course. However, it can be extended up to a period of 6 months maximum, with the written permission of the Head of the Department concerned.

13.4 A student shall be eligible for award of the M.C.A. degree if he / she fulfils all the following conditions.

- Registered and successfully completed all the courses and projects.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the course of his/her study within the stipulated time.
- Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and
- No disciplinary action is pending against him / her.

13.5 The degree shall be awarded after approval by the Academic Council.

# RULES

1. With regard to the conduct of the end-semester examination in any of the practical courses of the programme, the Head of the Department concerned shall appoint one examiner from the department not connected with the conduct of regular laboratory work, in addition to the teacher who handled the laboratory work during the semester.
2. In respect of all theory examinations, the paper setting shall be done by an external paper setter having a minimum of three years of teaching experience. The panel of paper setters for each course is to be prepared by the Board of Studies of the department concerned and approved by the Academic Council. The paper setters are to be appointed by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations.
3. The theory papers of end-semester examination will be evaluated by two examiners. The examiners may be internal or external. The average of the two evaluations shall be considered for the award of grade in that course.
4. If the difference of marks awarded by the two examiners of theory course exceeds 12 marks, the paper will have to be referred to third examiner for evaluation. The average of the two nearest evaluations of the three shall be considered for the award of the grade in that course.
5. Panel of examiners of evaluation for each course is to be prepared by the Board of Studies of the department concerned and approved by the Academic Council.
6. The examiner for evaluation should possess post graduate qualification and a minimum of three years teaching experience.
7. The appointment of examiners for evaluation of theory papers will be done by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations from a panel of examiners approved by the Academic Council.
8. Project work shall be evaluated by two examiners at the semester end examination. One examiner shall be internal and the other be external. The Vice Chancellor can permit appointment of second examiner to be internal when an external examiner is not available.
9. The attendance marks ( maximum 5) shall be allotted as follows :

<b>Percentage of Attendance</b>	<b>Marks</b>
76% to 80%	1
81% to 85%	2
86% to 90%	3
91% to 95%	4
96% to 100%	5

**COURSE STRUCTURE**  
**Master of Computer Applications (M.C.A.)**  
**PROGRAM CODE: SPRCA200700**

**First Semester**

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA101	Data Structures & Algorithms	3	1	0	4	3 hrs	60	40
SPRCA102	Mathematical Foundations of Computer Science	3	1	0	4	3 hrs	60	40
SPRCA103	Computer Organization	3	1	0	4	3 hrs	60	40
SPRCA104	Operating Systems	3	1	0	4	3 hrs	60	40
SPRCA105	Technical Communication and Writing Skills-I	3	1	0	3	3 hrs	60	40
SPRCA111	Data Structures Lab using C	0	0	3	3	3 hrs	-	100
SPRCA112	Digital Logic Design Lab	0	0	3	3	3 hrs	-	100
SPRCA113	Comprehensive Viva	-	-	-	1	-	20	-
Total Credits		15	5	6	26	21 hrs	320	400

L – Lectures T-Tutorial P– Practical C - Credits

**Second Semester**

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA201	Object Oriented Programming in C++	3	1	0	4	3 hrs	60	40
SPRCA202	Probability and Statistics	3	1	0	4	3 hrs	60	40
SPRCA203	Data Base Management Systems	3	1	0	4	3 hrs	60	40
SPRCA204	Computer Networks	3	1	0	4	3 hrs	60	40
SPRCA205	Systems Analysis and Design	3	1	0	4	3 hrs	60	40
SPRCA211	Object Oriented Programming with C++ Lab	0	0	3	2	3 hrs	-	100
SPRCA212	DBMS Lab	0	0	3	2	3 hrs	-	100
SPRCA213	Minor Project	-	-	-	2	-	50	50
SPRCA214	Comprehensive Viva	-	-	-	1	-	20	-
Total		15	5	6	27	21 hrs	370	450

L – Lectures T- Tutorial P– Practical C - Credits

## Master of Computer Applications (M.C.A.)

### Third Semester

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA301	Java Programming	3	1	0	4	3 hrs	60	40
SPRCA302	Optimization Techniques	3	1	0	4	3 hrs	60	40
SPRCA303	Design and Analysis of Algorithms	3	1	0	4	3 hrs	60	40
SPRCA304	Organizational Structure and Personnel Management	3	1	0	4	3 hrs	60	40
SPRCA305	Advances in DBMS	3	1	0	4	3 hrs	60	40
SPRCA311	Java Programming Lab	0	0	3	2	3 hrs	-	100
SPRCA312	Unix Programming Lab	0	0	3	2	3 hrs	-	100
SPRCA313	Technical Communication Skills Lab	0	0	3	2	3 hrs		100
SPRCA314	Comprehensive Viva	-	-	-	1	-	20	-
Total		15	5	9	27	24 hrs	320	500

L – Lectures T-Tutorial P- Practical C - Credits

### Fourth Semester

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA401	Object Oriented Software Engineering	3	1	0	4	3 hrs	60	40
SPRCA402	Cryptography & Network Security	3	1	0	4	3 hrs	60	40
SPRCA403	J2EE Technologies	3	1	0	4	3 hrs	60	40
SPRCA404	Technical Communication and Writing Skills – II	3	1	0	2	3 hrs	60	40
SPRCA421 SPRCA422 SPRCA423 SPRCA424	<b>Elective -I:</b> 1. Theory of Computation 2. Artificial Intelligence 3. Computer Graphics 4. Systems Programming	3	1	0	4	3 hrs	60	40
SPRCA411	UML Lab	0	0	3	2	3 hrs	-	100
SPRCA412	J2EE Technologies Lab	0	0	3	2	3 hrs	-	100
SPRCA413	Seminars and Technical Writing	-	-	-	3	-	-	100
SPRCA414	Comprehensive Viva	-	-	-	1	-	20	-
Total		15	5	6	26	21 hrs	320	500

L – Lectures T-Tutorial P- Practical C - Credits



## Master of Computer Applications (M.C.A.)

### Fifth Semester

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA501	Cloud Computing	3	1	0	4	3 hrs	60	40
SPRCA502	Image Processing	3	1	0	4	3 hrs	60	40
SPRCA503	Data Mining & Data Warehousing	3	1	0	4	3 hrs	60	40
SPRCA521 SPRCA522 SPRCA523	<b>Elective II:</b> 1. .NET Technologies 2. TCP/IP Protocol Suite 3. Soft Computing Methodologies	3	1	0	4	3 hrs	60	40
SPRCA531 SPRCA532 SPRCA533	<b>Elective III:</b> 1. Embedded Systems 2. Real Time Systems 3. Ethical Hacking	3	1	0	4	3 hrs	60	40
SPRCA511	Data Mining Lab	0	0	3	2	3 hrs	-	100
SPRCA512	Internet and Mobile Applications Lab	0	0	3	2	3 hrs	-	100
SPRCA513	Industrial Training	-	-	-	2	2 weeks	-	100
SPRCA514	Comprehensive Viva	-	-	-	1	-	20	-
Total		15	5	6	27	-	320	500

L – Lectures T-Tutorial P– Practical C - Credits

### Sixth Semester

Course Code	Name of the Course	Hrs. per week			C	Scheme of Examination		
		L	T	P		Duration	Sem End Exam	Continuous Evaluation
SPRCA621 SPRCA622 SPRCA623	<b>Elective IV:</b> 1. Mobile and Wireless Networks 2. Nano Technology 3. Advanced Network Security	3	1	0	4	3 hrs	60	40
SPRCA631 SPRCA632 SPRCA633	<b>Elective V:</b> 1. Human Resource Management 2. Software Quality and Testing 3. ERP and Supply Chain Management	3	1	0	4	3 hrs	60	40
SPRCA611	Project	-	-	-	12	16 weeks	50	50
Total		6	2	0	20	-	170	130

L – Lectures T- Tutorial P– Practical C - Credits

L	T	P	C
3	1	0	4

**Aim and Objective**

To introduce students to the different data structures and their applications. The emphasis is on the following: stacks, queues, linked lists, trees and graphs, hashing, sorting techniques and tree indexing techniques.

**UNIT - I****Algorithm Analysis and Abstract Data Types**

Definition of algorithm- Asymptotic notations- Running time calculations-checking analysis, Abstract Data Types (ADTs)- Arrays – Representation of Arrays – Operations on Arrays –Polynomials.

**UNIT - II****Linked Lists**

Singly Linked Lists – Circular Linked Lists – Doubly Linked Lists – Stacks – Queues – Circular Queues – Applications of stacks and Queues.

**UNIT - III****Trees**

Trees, Binary Trees, Binary Tree Traversals, Binary Tree Representations, Binary Search Trees, Application of Trees, AVL Trees, B Trees

**UNIT - IV****Searching & Sorting Techniques**

Linear Search & Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Various types of Hashing

**UNIT - V****Graphs**

Representation of Graphs – Graph Implementation – Graph Traversals– Application of Graph Traversals– Minimum Cost Spanning Trees – Shortest Path Problems.

**Text Books:**

1. Data Structures and Algorithm Analysis in C - Mark Allen Weiss, Addison Wesley, 2<sup>nd</sup> Edition
2. Data Structures and Algorithms Concepts, Techniques and Applications by G.A.V.Pai TMH 2008

**Reference Books:**

1. Data Structures through C in depth by Srivatsava, BPB publications, 2004
2. Data Structures using C by Yedidyah Langsam, Moshej Augenstein Aaron M Tenenbaum, Pearson Education 2009

L	T	P	C
3	1	0	4

SPRCA102

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) I Semester  
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

**Aim and Objective:** This course is introduced in the curriculum to understand the concept and importance of basic mathematical concepts and numerical methods. On completion of this course, the student shall be able to understand the concepts and results in Mathematical Logic, Set Theory, Lattices and Boolean Algebra, Graph Theory and Numerical methods.

**UNIT-I**

**Mathematical Logic:** Statements and Notation – Connectives – Normal Forms – The theory of Inference for the Statement calculus – The Predicate Calculus – Inference theory of the Predicate Calculus.

**UNIT-II**

**Set Theory:** Basic concepts of Set Theory - Relations and Ordering - Functions : Definitions and Introduction, composite of Functions, Inverse functions, Binary and n-ary operations- Characteristic Function of a Set.

**UNIT-III**

**Lattices And Boolean Algebra:** Lattices : Definition and examples – properties of lattices- sub lattices, direct product and Homomorphism-some special lattices.

Boolean Algebra : Definition and examples – subalgebra , direct product and homomorphism-Boolean functions.

**UNIT-IV**

**Graph Theory:** Graphs and Multigraphs- Subgraphs, Isomorphic and Homeomorphic Graphs- Paths, Connectivity- The Bridges of Konigsberg, Traversable Multigraphs- Labeled and Weighted Graphs- Complete, Regular, and Bipartite Graphs- Tree Graphs- Planar Graphs-Graph Colorings-Directed Graphs-Basic Definitions- Rooted Trees- Sequential Representation of Directed Graphs- Warshall’s Algorithm; Shortest Paths.

**UNIT-V**

**Numerical Methods:** Solution of Algebraic and Transcendental Equations : The Bisection Method – The method of False Position – The Iteration Methods – Newton Raphson Method. Solutions to Systems of Nonlinear Equations: The Method of Iteration – Newton-Raphson method . Numerical Integration : Trapezoidal Rule- Simpson’s 1/3 – rule, Simpson’s 3/8<sup>th</sup> rule.

**Text Books:**

1. Discrete Mathematical Structures with applications to computer Science – J.P. Tremblay & R. Manohar, Tata McGraw-Hill .
2. Discrete Mathematcs–Seymour Lipschutz & Marc Lipson, Schaum’s outlines–Tata McGraw Hill.
3. Introductory Methods of Numerical Analysis- S.S.Sastry, Prentice-Hall India.

**Reference Books:**

1. Discrete Mathematics and its Applications – Kenneth H.Rosen , Tata McGraw-Hill.
2. Numerical Methods for Engineers – Steven C.Chopra and Raymond P.Canale,Mc Graw Hill.

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) I Semester**  
**COMPUTER ORGANIZATION**

SPRCA103

L	T	P	C
3	1	0	4

**Aim and Objective :** To introduce the design and organization of digital computers by showing the relationship between hardware and software and focusing on the concepts that are the basis of the current computers.

**UNIT-I**

**Data Representation**-Number Systems, Complements, Fixed-Point representation, Floating-point Representation, Other Binary Codes, Error Detection Codes.

**Register Transfer and Micro operations** – Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit

**UNIT-II**

**Basic Computer Organization and Design** - Instruction Codes, Computers Registers, Computers Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic

**UNIT-III**

**Central Processing Unit** – Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC)

**UNIT-IV**

**Computer Arithmetic** – Introduction, Addition and Subtraction, Multiplication Algorithms, Floating-Point Arithmetic Operation, Decimal Arithmetic Unit.

**Input-Output Organization** – Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication

**UNIT-V**

**Memory Organization** - Memory Hierarch, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware

**Text Book :**

1. Computer Organization, M. Morris Mano, 3<sup>rd</sup> Edition, Pearson Prentice Hall

**Reference Books:**

1. Computer Organization , Earl Hamacher, Zvonko Uralesic, Safwat Zaky, MCGraw Hill , 5th Edition
2. Computer Architecture and organization , John P. Hayes, Tata McGraw Hill, 3<sup>rd</sup> Edition

L	T	P	C
3	1	0	4

**Aim and Objective:** To provide a core knowledge of operating system concepts and techniques.

#### UNIT – I

**Introduction:** What is an Operating System? Mainframe systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real-Time systems, Handheld systems, Feature migration, Computing environments.

**Operating System Structures:** System components, Operating-system services, System calls, System programs, System structure, Virtual machines, System design and implementation, System generation.

#### UNIT - II

**Processes:** Process concept, Process scheduling, Operations on processes, Cooperating processes, Interprocess communication, Communication in client-server Systems.

**Threads:** Overview, Multithreading models, Threading issues, Linux threads, Java threads.

**CPU Scheduling :** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-Time scheduling, Algorithm evaluation.

#### UNIT-III

**Process Synchronization :** Background, The Critical-section problem, Synchronization hardware, Semaphores, classic problems of Synchronization, Critical regions, Monitors.

**Deadlocks:** System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

#### UNIT – IV

**Memory Management:** Background, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with paging.

**Virtual Memory:** Background, Demand paging, Process creation, Page replacement, Allocation of frames, Thrashing, Other considerations.

#### UNIT – V

**Protection:** Goals of protection, Domain of protection, Access matrix, Implementation of access matrix, Revocation of access rights, Capability-based systems, Language-based protection.

**Security:** The Security problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications.

**Text Book:**

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 6<sup>th</sup> Edition, John Wiley & Sons, Inc.

**Reference Book:**

1. Operating Systems, Achyut S. Godbole, Tata McGrawHill..
2. Operating Systems: Internals and Design Principles, William Stallings, 5<sup>th</sup> Edition, Pearson Education

L	T	P	C
3	0	0	3

**Aim and Objective:** In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of MCA students. The prescribed book and the exercises are meant to serve broadly as students handbooks.

**UNIT – I**

1. Astronomy from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.
2. Synonyms, Antonyms, One Word Substitutes, Words often confused Phrasal Verbs

**UNIT – II**

3. Information Technology from LEARNING ENGLISH: A Communicative Approach Orient Longman, 2005.
4. Foreign Phrases, Tenses, Concord

**UNIT – III**

5. Humour from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005
6. Error Analysis, Idioms, Paragraph Writing

**UNIT – IV**

7. Environment from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005
8. Essay Writing, Dialogue Writing, Reading Comprehension

**UNIT – V**

9. Inspiration from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005
10. Human Interest from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005

**Text Book :**

1. LEARNING ENGLISH: A Communicative Approach, : Orient Longman, Hyderabad , 2006

**Reference Books :**

1. Current English for colleges, N. Krishna Swamy & T. Sri Raman, Macmillan
2. Examine your English, Margaret Maison, Macmillan.

<b>L</b>	<b>P</b>	<b>C</b>
1	2	3

**Aim and Objective:** To teach the student to write programs in C to solve the problems and  
 To introduce the student to simple linear data structures such as lists, stacks, queues.

1. a) Write a C program to find the sum of individual digits of a positive integer.  
 b) Write a C program to find the roots of a quadratic equation.
2. a) Write a program to generate Fibonacci series  
 b) Write a C program to calculate the following Sum:  $1-x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
3. a) Write a C program to find both the largest and smallest number in a list of integers.  
 b) Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices
4. a) Write a C program to determine if the given string is a palindrome or not  
 b) Write a C program to perform string functions a)with library functions b)without library functions
5. Write C programs that use both recursive and non-recursive functions
  - a) To find the factorial of a given integer.
  - b) To find the GCD of two given integers.
  - c) To solve Towers of Hanoi problem.
6. a) Write a program to swap two numbers using pointers.  
 b) Write a program to find sum of given array using pointers
7. a) Write a C program which copies one file to another.  
 b) Write a C program to reverse the first n characters in a file.  
 (Note: The file name and n are specified on the command line.)
8. a) Write a C programme to display the contents of a file.  
 b) Write a C programme to merge two files into a third file.
9. Write C programs that implement stack (its operations) using i) Arrays ii) Pointers
10. Write C programs that implement Queue (its operations) using i) Arrays ii) Pointers
11. Write a C program that uses Stack operations to perform the following:
  - a) Converting infix expression into postfix expression
  - b) Evaluating the postfix expression
12. Write a C program that uses functions to perform the following operations on singly linked list.:
  - a) Creation
  - b) Insertion
  - c) Deletion
  - d) Traversal
13. Write a C program that uses functions to perform the following operations on double linked list.:
  - a) Creation
  - b) Insertion
  - c) Deletion
  - d) Traversal
14. Write a C program that uses functions to perform the following operations on circular linked list.:
  - a) Creation
  - b) Insertion
  - c) Deletion
  - d) Traversal
15. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
  - a) Bubble sort
  - b) Selection sort
  - c) Insertion sort
  - d) Heap sort
16. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers: a) Linear search b) Binary search
17. Write C program that implements the Quick sort method to sort a given list of integers in ascending order.
18. Write C program that implement the Merge sort method to sort a given list of integers in ascending order.
19. Write a C program to implement binary tree implementation and traversals
20. Write a C program to implement binary search tree.

**References Books:**

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
2. Data Structures through C , Yashwant Kanetkar, BPB publications

**ASTER OF COMPUTER APPLICATIONS (M.C.A.)I Semester  
DIGITAL LOGIC DESIGN LAB**

SPRCA112

<b>L</b>	<b>P</b>	<b>C</b>
1	2	3

**Theory :**

**Digital logic fundamentals-** Boolean algebra, Boolean logic, logic gate fundamentals-basic and Universal gates

**Combinational Circuit :** Explanation regarding Half Adder and Full Adders ,Half Subtractor and Full Subtractor and 3-bit comparator.

**Combinational Circuit** –Multiplexer 4\*1 Multiplexer,decoders, three bit Binary Up Counter.

**Sequential Circuit** Explanation regarding different types of flip-flop, Design steps involved in flip-flop

**Registers and counters:** Shift register with shift left and Shift right operations..

Counters- Three bit Binary Up Counter, Mod -9 counter and a BCD Counter

**Laboratory Experiments:**

1. Verification of Logic Gates: AND, OR, NOT, NAND, NOR, Ex-OR, 3 Input AND on the Bread Board Trainer
2. Implementation of AND , OR, NOT, Ex-OR gate functioning using NAND, NOR Gates
3. Design Adders, Subtractors Using Logic Gates.
4. Design of a Three Bit Comparator Circuit.
5. Design a 3 \* 8 Decoder Using Two 2 \* 4 Decoders. Design a BCD Counter.
6. Design a 4 \* 1 Multiplexer Using Logic Gates.
7. Design RS, JK, D, T Flips Flops Using Logic Gates
8. Design a Shift Register that performs shift left and Shift right operations.
9. Design a three bit Binary Up Counter.
10. Design a Mod -9 counter.
11. Design a counter with the following series 0, 4, 2, 1, 6 and repeat using JK flip flop
12. Design a BCD Counter.

**Reference Book:**

1. Digital Logic & Computer Design Morris M. Mano , Prentice Hall India, 3<sup>rd</sup> Edition



SPRCA113

**MASTER OF COMPUTER APPLICATIONS (M.C.A.)I Semester  
COMPREHENSIVE VIVA**

L	P	C
0	0	1

**Aim and Objective :** The comprehensive viva will be conducted to assess the student understanding in various subjects studied during the semester.

## **SECOND SEMESTER**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	1	0	4

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester**  
**OBJECT ORIENTED PROGRAMMING IN C++**

**SPRCA201**

**Aim and Objective :** To introduce students to the concept of Object Oriented Programming namely operator Over Loading , Inheritance, Polymorphism. The student will be able to develop application programs applying object oriented concepts.

**UNIT - I**

**Principles of Object Oriented Programming:** Software Evolution, Procedure oriented Vs Object Oriented Programming Paradigm, Basic Concepts of OOPs, Benefits of OOP, Features and Applications of OOP, Structure of C++ program.

**Data Types, Operators and Expressions:**

Character set, tokens, Keywords, Identifiers and Constants,, Data types and Sizes, Variables , Operators , Expression and their types, Implicit Conversion, Operator Overloading, Operator precedence , Control Structures.

**UNIT - II**

**Functions in C++:** Function Prototype, Call by reference, Inline functions, Default Arguments, const Arguments, Function Overloading, friend and Virtual functions, Library Functions.

**Classes and Objects :** Class, access specifier, Accessing Class members, Defining Member functions, Memory Allocation for Objects, array of Objects, Static Data Members, Static Member Functions, Friend Functions, Constructor, Parameterized Constructor, Dynamic initialization of objects, Copy Constructor, Multiple Constructors in a class, Constructor with default arguments, Dynamic Constructors, Destructors.

**UNIT - III**

**Operator Overloading:** Definition, Overloading Unary, Binary operators, Overloading Binary Operators using Friends, String Manipulation using operators.

**UNIT - IV**

**Inheritance, Virtual Functions, Templates :** Base class, derived class, Single, Multiple, Multi Level , Hierarchical , Hybrid Inheritance, Need for Virtual functions, Virtual base classes, Pure Virtual Functions, Virtual Destructors. Generic Classes, Function Templates, Class template.

**UNIT - V**

**I/O and Files :** Streams and Stream Classes, Unformatted and Formatted I/O operations, Manipulators. File – Operations, Modes, Sequential and Random Access Files.

**Exception Handling:** Basics of Exception handling, Exception handling Mechanism, Throwing and Catching Mechanism.

**Text Book:**

1. Object Oriented Programming in C++ , E. Balaguruswamy, 3rd Edition, Tata McGraw Hill Publication.

**Reference Books:**

1. Mastering C++ , K.R.Venu Gopal , Tata McGraw Hill Publication. Object Oriented Programming in C++ Bhave , Patekar.
2. Standard C++ with Object-Oriented Programming, Paul S.Wang, Course Technology; 2<sup>nd</sup> Edition

L	T	P	C
3	1	0	4

**Aim and Objective:** To expose the students to apply certain statistical concepts in practical applications of computer science areas. On completion of this course the student will be familiar with basic concepts of probability and random variables, distribution of random variables, correlation and regression analysis and to know the concepts of sampling, tests based on hypothesis.

#### UNIT – I

**Probability:** Sample space – Events – Axiomatic approach to probability – conditional probability Independent events – Baye's formula with applications.

**Random Variables** – Continuous and discrete random variables – Distribution function of a random variable- conditional and marginal distributions- – Expectation, variance, coefficient of variation, moment generation function.

#### UNIT – II

**Probability Distribution:** Discrete distributions – Binomial poisson and geometric Distributions – Continuous distributions – Uniform, Normal, Exponential.

#### UNIT – III

**Correlation and Regression:** Correlation coefficient – Rank Correlation coefficient of determination – Linear Regression – Method of Least squares – Fitting of the curve of the form  $ax + b$ ,  $ax^2 + bx + c$ ,  $ab^x$ ,  $ax^b$  and  $ae^{bx}$ .

#### UNIT – IV

**Sampling Theory:** Concept of sampling – Methods of sampling – simple random sampling – Systematic sampling and stratified random sampling (descriptions only) – concepts of sampling distributions and standard error – point estimation (concepts only) – Interval estimation of mean and proportion.

#### UNIT – V

**Test of Hypotheses:** Critical region – Two types of Errors – Level of significance – power of the test – Large sample tests for mean and proportion – Exact tests based on t, F and Chi-square distributions.

**Text Book:**

1. Fundamentals of Mathematical Statistics – S.C. Gupta & V.K. Kapoor – Sultan Chand & Sons-2002.

**Reference Books:**

1. Irwin Millor and John E. Freund “ Probability and Statistics for Engineers”, PHI
2. Probability and Statistics, 2/e Spiegel, TMH.

L	T	P	C
3	1	0	4

**Aim and Objective:** The aim of this course is to introduce the students to basic concepts of databases and database management systems with emphasize on relational databases. The entity relationship diagram helps the students to design the database and the concept of normalization.

#### UNIT-I

**Introduction and Conceptual Modeling:**

**Databases and Database Users:** Introduction, Characteristics of Database Approach, Actors on the Scene, Workers defining the Scene, Advantages of using DBMS Approach.

**Database System-Concepts and Architecture :** Data Models, Schemas and Instance; Three-Schema Architecture and Data Independence; Database Language and Interface, The Database System Environment; Centralized and Client/Server Architecture of Database Management Systems; Classification of Database Management Systems.

#### UNIT-II

**Data Modeling Using The E-R Model:** High- Level Conceptual Data Models for Database Design; Entity Types, Entity Sets, Attributes and Keys; Relationship Types, Relationship Sets, Roles and Structural Constraint; Weak Entity Types, ER Diagrams, Naming Conventions and Design Issues. Enhanced ER and UML Modeling, An Example of University EER Schema and Formal Definitions of EER Models, UML Class Diagrams; Relationship Types of Degree Higher Than Two.

**The Relational Data Model and Relational Database Constraints :** Relational Model Concepts, Relational Model Constraints and Relational Database Schemas; Updating Operations and Dealing with Constraints Violations.

#### UNIT-III

**The Relational Algebra :** Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.

**Relational Database Design By ER And EER-To-Relational Mapping:** Relational Database Design using ER-to-Relational Mapping; Mapping EER Model Constructs to Relations.

#### UNIT-IV

**SQL: Schema Definition, Basic Constraints, and Queries:** SQL Data Definition, Specifying Basic Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE, UPDATE Statements in SQL, Additional Features of SQL, Specifying General Constraints As Assertions, Views, Database Programming Issues and Techniques.

**Relational Database Design:** Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of 2nd and 3rd Normal Forms, Boyce- Codd Normal Form, Properties of Relational Decomposition, Algorithms for Relational Database Schema Design, Multi valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

#### UNIT-V

**Transaction Processing Concepts:**

**Introduction to Transaction Processing Concepts and Theory:** Introduction to Transaction Processing; Transaction and System Concepts; Characteristics Schedule based on recoverability, Concurrency Control Techniques, Data base Recovery Concepts, Recovery Techniques.

**Text Book:**

1. Fundamentals of Database Systems Ramez Elmasri and Shamkant B. Navathe, Durvasula V.L.N. Somayajulu, Shyam K. Gupta 4th edition, Pearson education.

**Reference Books:**

1. Database Concepts, Abraham Silberschatz, Henry F Korth, S.Sudarshan, McGraw-Hill
2. Database Management Systems– second edition- Raghu Ramakrishnan, Johannes Gehrke- TMH,2000.

L	T	P	C
3	1	0	4

**Aim and Objective :** To produce a core knowledge of networking concepts and techniques to design simple network, provide in-depth knowledge about the various communication technologies and enable the student to understand how information are transmitted in networks.

#### UNIT - I

**Introduction:** Data Communications, Networks, The Internet, Protocols and Standards

**Network Models:** Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/IP Protocol Suite, Addressing.

**Digital Transmission:** Transmission Modes.

#### UNIT- II

**Transmission Media:** Guided Media, Unguided Media: Wireless Transmission.

**Switching:** Circuit Switched Networks, Datagram Networks, Virtual- Circuit Networks, Structure of a Switch.

**Data Link Layer, Error Detection and Correction:** Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum.

#### UNIT-III

**Data Link Control:** Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-to-Point Protocol

**Wired LANs: Ethernet:** IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet.

**Connecting LANs, Backbone Networks and Virtual LANs:** Connecting Devices, Backbone Networks, Virtual LANs.

#### UNIT –IV

**Network Layer: Address Mapping, Error Reporting and Multicasting:** Address Mapping, ICMP, IGMP,ICMPv6

**Delivery, Forwarding and Routing:** Delivery, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

#### UNIT – V

**Transport Layer :** Process to Process Delivery: UDP,TCP and SCTP

**Application Layer :**

**Domain Name System:** Namespace, Domain Name Space, Distribution of Name Space, DNS in the INTERNET, RESOLUTION, DNS Messages, Types of Records, Registrars, Dynamic Domain Name System(DDNS), Encapsulation.

**Text Book:**

1. Data Communications and Networking : Behrouz A Forouzan, 4<sup>th</sup> Edition, TMH.

**Reference Book:**

1. Computer Network : Andrew S. Tennanbaum
2. Computer Networks: A systems approach, by Larry L.Peterson, Bruse S.Davie, 3<sup>rd</sup> Edition, Morgan Kaufmann Publishers

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	0	3

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester  
SYSTEMS ANALYSIS AND DESIGN**

**SPRCA205**

**Aim and objective:** To introduce the concepts and skills of systems analysis and design which includes expanded coverage of dataflow diagrams and process specifications. The objective is to introduce the softwares used by analysts, designers to manage projects, analyze and document systems, design new systems and implement their plans. It introduces a detailed case study for E-commerce application.

**UNIT - I**

**The System Development Environment:** Introduction, A Modern Approach to Systems Analysis and Design, Type of Information System and Systems Development, Developing Information systems and the Systems Development Life cycle, The heart of the Systems Development process, Object-Oriented Analysis and Development, Our Approach to Systems Development.

**The Origins Of Software:** Systems Acquisition, Sources of Software, Information Technology Services Firms, Open Source Software, Choosing Off-the-Shelf Software, Validating Purchased Software Information, Reuse.

**UNIT - II**

**Managing the Information Systems Project:** Pine Valley Furniture Company Background, Managing the Information Systems Project, Representing and Scheduling Project Plans, Using Project Management Software. **BEC CASE: COMPANY BACKGROUND**

**Identifying and Selecting Systems Development Projects:** Identifying and Selecting Systems Development Projects, Corporate and Information System Planning, Electronic Commerce Application.

**UNIT- III**

**Initiating and Planning Systems Development Projects:** Initiating and Planning Systems Development Projects, The Process of Initiating and Planning IS Development Projects, Building and Reviewing the Baseline Project Plan.

**Determining System Requirements:** Performing Requirements Determination, Traditional Methods for Determining Requirements, Contemporary methods for Determining System Requirements, Radical Methods for Determining System Requirements, Requirements Determination Using Agile Methodologies.

**UNIT - IV**

**Structuring System Process Requirements:** Process Modeling, Data Flow Diagramming Mechanics, Four Different Types of DFDs, Using Data Flow Diagramming in Analysis Process, Electronic Commerce Application: Process Modeling Using Data Flow Diagrams.

**Structuring System Logic Requirements:** Logic Modeling, Modeling Logic with Structured English, Modeling Logic with Decision Tables, Deciding Among Structured English and Decision Tables, Electronic Commerce Application: Logic Modeling.

**UNIT - V**

**System Implementation:** System Implementation, Installation, Documenting the System, Training and Supporting Users, Training Information Systems Users, Organizational Issues in Systems Implementations

**Maintaining Information Systems:** Maintaining Info systems, Conducting Systems Maintenance, Web Site Maintenance.

**Text Book:**

1. Modern Systems Analysis and Design Jeffrey A. Hoffer, J Oey F. George, J Osetch S. Valacich, 5<sup>th</sup> Edition, 2009, Pearson Education

**Reference Books:**

1. System Analysis and Design by Kenneth E. Kendall, Julie E. Kendall, 8<sup>th</sup> Edition, 2010, Prentice Hall
2. Analysis and design of information systems, James A. Sen 2<sup>nd</sup> Edition, 2009, TMH

<b>L</b>	<b>P</b>	<b>C</b>
0	3	3

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester  
OBJECT ORIENTED PROGRAMMING WITH C++LAB**

**SPRCA211**

1. Write a program to illustrate the Class Declarations, Definition and accessing Class members.
2. Write a program to implement a class student having the following members :

Data Members	Member Functions
Name of the student	To assign Initial Value
Marks of the Student	Compute Total and Average
	To Display the Data
3. Write a program to demonstrate Operator OverLoading.
4. Write a program to demonstrate Function OverLoading.
5. Write a program to demonstrate Friend Function and Friend Class.
6. Write a program to access members of a student class using pointer to object members.
7. Write a Program to demonstrate containership.
8. Write a Program to generate Fibonacci Series by Using Constructor to initialize the data members.
9. Write a program to demonstrate multiple Inheritance.
10. Write a program to invoking derived class member through base class pointer.
11. Write a template based program to sort the given list of elements.
12. Write a program to demonstrate the catching of all exceptions.
13. Write a program containing a possible exception. Use a try block to throw it and a catch block to handle it properly.
14. Write a program to demonstrate Dynamic Binding through Virtual Functions.
15. Write a program to perform insertion, deletion, updation of student records using sequential and random access files.

**Text Book:**

1. Object Oriented Programming in C++ , E. Balaguruswamy, 3<sup>rd</sup> Edition, Tata McGraw Hill Publications.

**Reference Books:**

1. Mastering C++ , K.R.Venu Gopal , Tata McGraw Hill Publications.
2. Object Oriented Programming in C++ , Bhawe , Patekar.



<b>L</b>	<b>P</b>	<b>C</b>
0	3	2

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester  
DATABASE MANAGEMENT SYSTEMS LAB**

**SPRCA212**

1. i) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables)  
ii) Simple queries to access data from tables using SELECT statement and WHERE condition
2. i) Queries using built in functions : Aggregate functions - COUNT, SUM, AVG, MAX and MIN, GROUP BY, HAVING, Arithmetic Functions: Sign, Abs, Ceiling, floor, Exp, Power, Log, Sqrt, String functions : Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr, Date functions : Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round  
ii) Queries using Conversion functions : To\_char, to\_number and to\_date
3. i) Queries using JOINS -NATURAL JOIN, INNERJOIN, OUTER JOINS .  
ii) Queries along with sub queries and correlated queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, MINUS
4. i) Creating other Schema Objects : Defining Views, Creating Views, Using Views to Change Data, Dropping Views, , creating Indexes and sequences.  
ii) Using DCL commands : COMMIT and ROLLBACK.
5. Creation of simple PL/SQL program which includes declaration section, executable section, SELECT .... INTO clause, and exception –Handling section and raise an exception if no records were found.
6. i) Develop programs that includes the features of NESTED IF and CASE.  
ii) Program development using WHILE LOOP, FOR LOOPS, nested loops using ERROR Handling, BUILT – IN Exceptions and RAISE- APPLICATION ERROR.
7. i) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES  
ii) Program development using creation of stored functions, invoke functions in SQL Statements.
8. Develop programs using CURSORS and TRIGGERS

**Text Books :**

1. SQL, PL/SQL The programming language of ORACLE By Ivanbayross
2. Programming Oracle triggers and stored procedures, Kevin Owens

<b>L</b>	<b>P</b>	<b>C</b>
0	0	2

**SPRCA213**

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester  
MINOR PROJECT**

**Aim and Objective:** To carry out a short term project by specifying the system requirement and the design of the data base

<b>L</b>	<b>P</b>	<b>C</b>
0	0	1

**SPRCA214**

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester  
COMPREHENSIVE VIVA**

**Aim and Objective :** The comprehensive viva will be conducted to assess the student understanding in various subjects studied during the semester

## **THIRD SEMESTER**

L	T	P	C
3	1	0	4

**Aim and Objective:** The aim of the course is to make the students learn the basic concepts of Java programming. This course covers preliminaries, I/O streaming and file handling and make the students learn how to program in basic concepts, packages, threads. I/Os, collection framework, generics, annotations in Java and allow the students to implement effectively.

#### UNIT - I

**The Primaries and Control Statements** - Introduction to Java – Features of Java – Object Oriented Concepts – Lexical Issues – Data Types – Variables – Arrays- Operators – Control Statements.

#### UNIT - II

**Classes And Objects** - Classes – Objects – Constructors – Overloading Methods, Constructors– Static And Final Methods – Nested And Inner Classes – String Class – Inheritance – Member Access-- Using Super–Overriding Methods-Dynamic Method Dispatch -Abstract Class.

#### UNIT - III

**Packages and Threads** - Packages – Access Protection – Importing Packages – Interfaces – Exception Handling – Throw and Throws – Thread – Thread Model-Synchronization – Messaging – Runnable Interface – Thread Methods- Interthread Communication – Deadlock – Suspending, Resuming and stopping threads – Multithreading.

#### UNIT – IV

**Input/Output Streams** : Overview of Streams, Bytes vs. Characters , Converting Byte Streams to Character Streams, File Object, Binary Input and Output, PrintWriter Class, Reading and Writing Objects, Basic and Filtered Streams.

**Collection Framework:** The Collections Framework , The Set Interface, Set Implementation Classes, The List Interface, List Implementation Classes, The Map Interface, Map Implementation Classes.

#### UNIT- V

**Generics:** Using Generics, Type Erasure, Type Boundaries, Wildcards , Generic Methods, Strengths and Weaknesses of Generics, Legacy Code and Generics

**Annotations:** Uses for Meta-Data, The Annotations Model, Annotation Types and Annotations, Built-In Annotations, Annotations vs. Descriptors (XML).

#### **Text Book:**

1. The Complete Reference Java 2 – Herbert Schildt -7<sup>th</sup> Edition- -TATA McGraw Hill Edition, 2006

#### **Reference Books:**

1. Murach’s Java SE 6- Joel Murach, Andrea Steelman, Mike Murach & Associates- Mike Murach & Associates, illustrated 2007
2. The Java Programming Language, K. Arnold and J. Gosling- 4th Edition -Pearson Education, 2006.

L	T	P	C
3	1	0	4

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) III Semester  
OPTIMIZATION TECHNIQUES**

**SPRCA302**

**Aim and Objective:** To introduce various optimization techniques and their computer implementation.

**UNIT - I**

**Overview of operations Research:** OR models – OR Techniques.

**Linear Programming:** Introduction – Mathematical Formulation - Graphical solution; Basic feasible solutions - simplex algorithm – artificial variables – Big M and two phase method – Degeneracy - alternative optima – unbounded solutions – infeasible solutions.

**Dual problems:** Relation between primal and dual problems – Dual simplex method.

**UNIT - II**

**Integer Programming:** Cutting plan algorithm - Branch and Bound Algorithms

**Job Sequencing:** Introduction – Solution of sequencing problems – processing of n jobs through 2 Machines, n jobs through 3 machines and n jobs through m machines.

**UNIT - III**

**Transportation model:** initial solutions. North West corner Rule - lowest cost method –Vogels approximation method – Optimal solution – MODI method –Assignment problem –Hungarian Method - Traveling Sales man problem.

**UNIT - IV**

**Game theory:** Two person Zero Sum Games – Mixed strategy games and their Algorithms.

**UNIT - V**

**Network Models :** Definitions – CPM and PERT – Their Algorithms

**Dynamic Programming:** Recursive nature of dynamic programming – Forward and Backward Recursion

**Text Book:**

1. Operations Research – An Introduction- Handy A Taha - 8<sup>th</sup> edition --Pearson Education,2008.

**Reference Books:**

1. Operations Research - Sharma. S.D- Keder Nath Ram Nath & co., 1992.
2. Operations Research - Kanti Swaroop, Manmohan and P.K.Gupta- 4<sup>th</sup> edition – Sultan Chand & sons,1990

L	T	P	C
3	1	0	4

**Aim and Objective:** To introduce students, the concepts of algorithm analysis to find out the space and time complexity of different algorithms. Different design techniques such as greedy method, divide and conquer, backtracking, dynamic programming, branch and bound are to be studied for finding the solution to the different problems. It also provides an insight into the basic concepts of NP and NP-hard problems and their relevance in research.

#### UNIT- I

**Introduction To Algorithms:** Algorithm Specification -- Performance Analysis-- Introduction to Random Algorithms. **Divide And Conquer:** The General Method -- Binary Search -- Finding Maximum And Minimum -- Quick Sort -- Selection -- Strassen's Matrix Multiplication.

#### UNIT- II

**The Greedy Method:** The General Method – Knapsack Problem – Tree Vertex Splitting -Job Sequencing With Deadlines -- Minimum Cost Spanning Trees -- Single Source Shortest Paths.

#### UNIT- III

**Dynamic Programming:** The General Method -- Multistage Graphs -- All Pairs Shortest Paths -- Optimal Binary Search Trees – String Editing –Reliability Design - The Traveling Sales Person Problem.

#### UNIT -IV

**Basic Traversal and Search Techniques:** Techniques For Graphs ,Connected Components And Spanning Trees— Biconnected Components And DFS. **Back Tracking:** The General Method -- Eight Queens Problem -- Sum Of Subsets -- Graph Coloring – Hamiltonian Cycles.

#### UNIT- V

**Branch And Bound:** The Method – 0/1 Knapsack Problem- Traveling Salesperson Problem **Algebraic Problems:** The General Method -- Evaluation And Interpolation.  
**NP-Hard And NP-Complete Problems:** Basic Concepts.

#### **Text Book:**

1. Fundamentals of Computer Algorithms- - Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2<sup>nd</sup> Edition, University Press, 2007.

#### **Reference Books:**

1. Fundamentals of Algorithmics – G. Brassard and Bratley- PHI,1996
2. Introduction to Algorithms – 3<sup>rd</sup> edition- T.H. Cormen, C.E. Leiserson, R.L.Rivest-PHI,2010
3. Introduction to design and analysis of algorithms- 2<sup>nd</sup> edition - Anany Levitin, Pearson , 2007

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	0	3

**SPRCA304** **MASTER OF COMPUTER APPLICATIONS (M.C.A.) II Semester**  
**ORGANIZATIONAL STRUCTURE AND PERSONNEL MANAGEMENT**

**Aim and objective:** To introduce the students with the concepts of the structure of the organization and personnel management. The objective is to discuss the concepts of personnel administration, evolution and development, scope of personnel administration, training and development and emphasize the importance of communication..

**UNIT-I**

**Classical Theories of organization:** Functional approach, classical theories of organization, Division of labor, levels of authority, span of control, authority & responsibility, efficiency of Management.  
 Behavioral theories of organization, limitations of formal organization, human relation, group Behavior, committee and group making, motivation and morale.

**UNIT-II**

**Decision process approach:** Parts of organization system, development of corporate strategy, dynamics of decision, role of system, types models, mathematical planning models, deterministic and probabilistic models.  
**Personnel Function:** Evaluation, objectives, principles, philosophies and policies, duties & responsibilities of the manager, position of the personnel department in the organization, line and staff relationship & the changing concept of personnel management in India.

**UNIT-III**

**Manpower planning:** Uses benefits problems and limitations, manpower, inventory, manpower forecasting, job description, recruitment, job specification and job selection interviewing techniques, transfers, promotion and its policies.

**UNIT-IV**

**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.  
**Strategic management:** Objectives, importance policies, concept of core competence capability of organizational learning.

**UNIT-V**

**Communication:** Importance of communication, interpersonal communication barriers of communication, communication in organizations, using communication skills to manage Conflicts.

**Text Book:**

1. Dynamic personnel Administration, M.N Rudrabasavaraj, 2nd Edition, Himalaya Publishing House, Bombay.

**Reference Books:**

1. Organizational Behavior, S. Chand. L. M. Prasad,
2. Organizational Theory and Behavior, V. S. P. Rao, P. S. Narayana Konark Publishers Pvt. Ltd.
3. Principles of Management, Tripathi, Reddy, TMH



L	T	P	C
3	1	0	4

**Aim and Objective:** The objective of this course is to have overall view on various advanced databases concepts like query processing, advanced data types and new applications.

#### UNIT-I

**Object-Based Databases:** Overview, Complex data types, Structured types and inheritance in SQL, Table inheritance, Array and multiset types in SQL, Object identity and reference types in SQL, Implementing O-R features, Persistent programming languages, Object oriented versus object relations

**XML:** Motivation, Structure of XML data, XML document schema, Querying and transformation, Application programming interface to XML, storage of XML data, XML applications

#### UNIT-II

**Query Processing:** Overview, Measures of query cost, Selection operation, Sorting, Join operation, Evaluation of expression

**Query Optimization:** introduction, Transformation of relational expressions, catalog information for cost estimation, statistical information for cost estimation, cost based optimization, dynamic programming for choosing evaluation plans, materialized views

#### UNIT-III

**Database System Architectures:** Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems Network types

**Parallel Databases:** Introduction, I/O parallelism, Inter Query Parallelism, Intra Query Parallelism, Intra Operation Parallelism, Inter Operation Parallelism, Design of Parallel Systems

#### UNIT-IV

**Distributed Databases:** Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in Distributed databases, Availability, Distributed Query Processing, Heterogeneous distributed databases, Directory Systems

**Advanced Application Development:** Performance tuning, Performance Bench marks, Standardization, E-commerce, Legacy Systems

#### UNIT-V

**Advanced Data Types And New Applications:** motivation, Temporal Data, Spatial and Geographic databases, Multimedia Databases, Mobility and Personal Databases

**Advanced Transaction Processing:** Transaction-processing monitors, Transactional work flows, High performance transaction systems, Main memory databases, Real time transaction systems, Long duration transaction, Transaction management in multidatabase systems

**Text Book:**

1. Database System Concepts- Abraham Silberschatz, Henry F.Korth, S. Sudarshan - 5<sup>th</sup> Edition -TMH,2006.

**Reference Book:**

1. Fundamentals of Data base Systems- Ramez Elmasri and Sharnkanth B.Navathe - 5<sup>th</sup> edition - - Pearson Education, 2008
2. An introduction to database systems - C.J.Date-Addison Wesley – eighth edition, 2003

<b>L</b>	<b>P</b>	<b>C</b>
0	3	2

1. Program to demonstrate various data types, various variables, and various arrays.
2. Program to demonstrate various arithmetic operators, Bit wise operators, and relational operators
3. Program to demonstrate various control structures or control statements.
4. Program to demonstrate classes and objects
5. Program to demonstrate constructors and different number of parameters passed to constructors.
6. Program to demonstrate overloading methods and overloading constructors
7. Program to demonstrate call by value and call by reference
8. Program to demonstrate static variable and static class
9. Program to demonstrate single inheritance and multilevel inheritance
10. Program to demonstrate method over riding and dynamic method dispatch
11. Program to demonstrate Abstract Classes and Interfaces using packages
12. Program to demonstrate exception handling and Multiple catch clauses
13. Program to demonstrate Throw, throws, finally
14. Write a multi-threaded Java program to print all numbers below 100,000 that are both prime and Fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates Fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both.
15. Develop a Java package with simple Stack and Queue classes. Use JavaDoc comments for documentation.
16. Design a class for Complex numbers in Java. In addition to methods for basic operations on complex numbers, provide a method to return the number of active objects created
17. Design a Date class similar to the one provided in the java.util package.
18. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.
19. Design a Java interface for ADT Stack. Develop two different classes that implement this interface, one using array and the other using linked-list. Provide necessary exception handling in both the implementations.
20. Write a Java program to read a file that contains DNA sequences of arbitrary length one per line (note that each DNA sequence is just a String). Your program should sort the sequences in descending order with respect to the number of 'TATA' subsequences present. Finally write the sequences in sorted order into another file.

**Reference Book:**

1. Java Complete Reference- Herbert Schildt - 7<sup>th</sup> Edition -TMH,2006

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) III Semester**  
**UNIX PROGRAMMING LAB**

L	P	C
1	2	2

**SPRCA312**

1. Unix Utilities – Introduction to Unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, cp, mv ln, rm, unlink, mkdir, rmdir, du, df, mount, umount find, unmask, ulimit, ps, who, w, finger, arp, ftp, telnet, rlogin, text processing utilities and backup utilities, detailed commands to be covered are cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, tr, awk, tar, cpio.
2. Study about the General Purpose utilities  
a) Banner b) cal c) date d) calendar e) tty f) bc g) spell & fspell
3. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:  
i) File type ii) Number of links iii) Read, write and execute permissions  
v) Time of last access (Note : Use stat/fstat system calls)
4. Write a shell program to wish the user those who login to the system.
5. Write a Program to find out the next available UID in etc/passwd after ignoring all system users placed at the beginning and up to the occurrence of the user nobody.
6. Write a script - Disk Quota Warning  
SAs often create some scripts to automate certain tasks. One of them is the quota warning script. If quota is turned on, end users really appreciate their SAs to remind them once their space usage is exceeding the soft quota limit before it hits the hard limit. SAs can set up cron tasks to generate a disk usage report everyday and check the file and email the users who are exceeding the quota one by one. Each user shall receive an email addressed to individual like below:  
Dear user XXXXXX,  
You are receiving this email because you have exceeded your filesystem quota. The details are as follows  
Login id: xxxxxxx  
Space used: 42031 K  
Soft limit: 40000 K  
Hard limit: 50000 K  
Grace period: 6.7 days  
You will be receiving this reminder daily until you are under quota again.  
Please delete unnecessary files or backup your contents. You can contact us for assistance.  
Regards,  
System Administrator  
Office: XXXXX  
Phone: XXXXX
7. Write a program to remove blank lines from a file using (i) grep and (ii) sed (A blank line may contain either nothing or only whitespace characters)
8. Write a Program to Frame regular expressions to match these patterns:  
(i) Jefferies Jeffery jeffreys (ii) hitchen hitchin hitching (iii) Heard herd Hird (iv) dix dick dicks Dickson Dixon (v) Mcgee mcghee magee.

**Reference Books:**

1. Unix Concepts and Applications - Sumitabha Das -2<sup>nd</sup> Edition - Tata McGraw Hill, 2001
2. Learning Perl - Randal Schwartz , Tom Phoenix , brian d foy- oreilly, 5<sup>th</sup> Edition 2008
3. Unix Shell Programming Y.Kanetkar-BPB Pub.,2003

<b>L</b>	<b>P</b>	<b>C</b>
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**MASTER OF COMPUTER APPLICATIONS (M.C.A.) III Semester  
TECHNICAL COMMUNICATION SKILLS LAB**

**SPRCA313**

**Aim and Objectives:**

The language Lab focuses computer-aided multi-media instruction and language acquisition to achieve the following targets:

To expose the students to a variety of self-instructional, learner-friendly modes of languages learning.

To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.

To train them to use language effectively to face interviews, group discussions, public speaking.

To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

However, depending upon the availability of infrastructure and budget, the above targets can also be achieved by procuring the minimum required equipment suggested for the establishment of a Conventional Lab the details of which are given below. The lab should cater to the needs of the students to build up their confidence to help them develop leadership qualities through their communicative competence.

**ENGLISH LANGUAGE LABORATORY PRACTICE Syllabus**

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

Introduction to Phonetics.

Introduction to Vowels and Consonants and associated Phonetic symbols.

Introduction to Accent, Intonation and Rhythm.

Situational Dialogues / Role Play.

Public Speaking.

Debate

Group discussions

Facing Interviews

Resume preparation

e-correspondence

**Reference Books :**

1. Developing Communication Skills by Krishna Mohan & Meera Benerji (Macmillan)
2. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
3. Better English Pronunciation by JDO Connor (UBS-Cambridge)
4. Oxford Practice Grammar with Answers, John Eastwood, Oxford
5. Handbook of English Grammar and Usage, Mark Leaster and Larry Beason, Tata MCGraw-Hill
6. A text book of English Phonetics for Indian Students by T. Blalsubramanian (Macmillan)
7. Lingua TOEFL CBT Insider, by Dreamtech
8. TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
9. English Skills for Technical Students, WBSCTE with British Council, Ol
10. A Handbook of English for Competitive Examinations, by B Shyamala Rao, Blakie Books, Chennai.

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**SPRCA314**                      **MASTER OF COMPUTER APPLICATIONS (M.C.A.) III Semester**  
**COMPREHENSIVE VIVA**

**Aim and Objective :** The comprehensive viva will be conducted to assess the student understanding in various subjects studied during the semester

## **FOURTH SEMESTER**

L	T	P	C
3	1	0	4

**Aim and Objective:** The aim of this course is to provide the students for Object Oriented Software Engineering features. It deals with project development using Object Oriented Analysis and Object Oriented Design and Object Oriented Coding and Object Oriented Testing Techniques.

**UNIT-I**

**Software Engineering:** Software related problems, software engineering, concepts, development activities.

**Modeling:** Concepts, Modeling with UML

**UNIT-II**

**Project Organization & Communication:** Project Organization & communication concepts and their activities

**Requirements:** Requirements elicitation & its activities and managing requirements elicitation

**Analysis:** Analysis overview, concepts, activities and managing analysis

**UNIT-III**

**System Design: Decomposing the system :** System Design overview, System design concepts, and System design Activities , and managing System Design

**System design: addressing design goals :** An overview of system design activities and concepts UML Development diagram, System design goals, Managing system design

**UNIT-IV**

**Object Design: Reusing Pattern Solutions :** An overview of object design Reuse Concepts, Solution objects, inheritance and design patterns.

**An Object Design :Specifying Interfaces:** An overview of interface specification, interface specifications concepts & its activities and Managing object design

**UNIT-V**

**Testing:** Testing concepts, activities and managing testing

**Project Management** - Introduction, An overview of project management, Project Management Concepts, Project Management Activities.

**Text Book:**

1. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia

**Reference Books:**

1. Object-Oriented Software Engineering: Practical software development using UML and Java Timothy C. Lethbridge and Robert Laganier , McGraw-Hill Higher education
2. An Introduction to Object Oriented Systems Analysis and Design with UML and the Unified Process, Stephen R Schach, Tata McGraw-Hill

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3	1	0	4

SPRCA402

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester  
CRYPTOGRAPHY & NETWORK SECURITY**

**Aim and Objective :** To enable the students to understand the importance of physical security for a network center and to describe the encryption techniques, various security protection methods and to have the knowledge to design a secure computer network and establish a good security policy in a business environment.

**UNIT - I**

**Introduction :** Security goals, Attacks, Services and Mechanism, Techniques, Traditional Symmetric Key Ciphers Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers, Modern Symmetric-Key Ciphers, Modern Block Ciphers, Modern Stream Ciphers.

**UNIT – II**

**Data Encryption Standard (DES) :** Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES , Advanced Encryption Standard (AES) : Introduction, Transformations, Key Expansion, Ciphers, Analysis of AEEncipherment Using Modern Symmetric-Key Ciphers: Use of Modern Block Ciphers

**UNIT – III**

**Asymmetric-Key Cryptography :** Introduction, RSA Cryptosystem, Rabin Cryptosystem, Elgamal Cryptosystem, Elliptic Curve Cryptosystems, Cryptographic Hash Functions : Introduction, SHA, WHIRLPOOL, Digital Signature: Comparison, Process Services, Attack on Digital Signature, Digital Signature Schemes

**UNIT- IV**

**Key Management :** Symmetric-Key Distribution, KERBEROS, Symmetric Key Agreement, Public Key Distribution. Network Security, Security at the Application Layer: E-MAIL, PGP and S/MIME

**UNIT – V**

**Security at the Transport Layer :** SSL and TLS, SSL Architecture, Protocols, SSL Message Formats, Transport Layer Security, Security at the Network Layer : IP Sec, Two Modes, Two Security Protocols, Security Association, Security policy, IKE.

**Text Book:**

1. Cryptography and Network Security, Behrouz A. Forouzan, Tata McGraw-Hill, New Delhi.

**Reference Books:**

1. Network Security : Private Communication in a Public World, Kaufman, Pearson Education Asia, New Delhi
2. Cryptography and Network Security, William Stallings, Pearson Education, Asia, New Delhi.



**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester  
J2EE TECHNOLOGIES**

**SPRCA403**

L	T	P	C
3	1	0	4

**Aim and Objective :** To enable the student to understand the importance of various advances java features like jdbc, java servlets and jsp, enterprise java beans. The main emphasis of this course is to develop the projects using the advanced java concepts .

**UNIT-I**

**JDBC:** What is jdbc, jdbc API, Understanding jdbc architecture, jdbc types, different operations using jdbc connectivity, Prepared statement, Callable statement.

**Java Servlet Technology:** What is a Servlet?, The Example Servlets, Servlet Life Cycle, Sharing Information, Initializing a Servlet, Writing Service Methods, Filtering Requests and Responses, Invoking Other web Resources, Accessing the Web Context Maintaining Client State, Finalizing a Servlet, Further Information.

**UNIT-II**

**Java server Pages Technology:** What is a JSP Page? The Example JSP Pages, The Life Cycle of a JSP Page, Creating Static Content, Creating Dynamic Content, Expression Language, Java Beans Components, Using Custom Tags, Reusing Content in JSP Pages, Transferring Control to Another Web Component, Including an Applet, Setting Properties for Groups of JSP Pages, Further Information.

**Java sever pages standard Tag Library:** Using JSTL, Core Tag Library, XML Tag Library, Internationalization Tag Library, SQL Tag Library

**UNIT-III**

**Custom Tags in JSP Pages:** What is a Custom Tag? Types of Tags, Encapsulating Reusable Content Using Tag Files, Tag Library Descriptors, Programming Simple Tag Handlers

**Scripting in JSP Pages:** Using Scripting, Disabling Scripting, Declarations, Scriptlets, Expressions, Programming Tags That Accept Scripting Elements.

**UNIT-IV**

**JSF (Java Server Faces):** Understanding Front-controller design pattern, Creating user interface using JSF UI elements, Defining page navigation using faces-config.xml, Working with Managed/Backing beans, Validating and converting user input, Working with events and listeners.

**Struts 2:** What is MVC design pattern, Understanding controller in Struts and configuring it, Creating user interface with struts UI elements, Creating Action Forms and Action classes, Validating user input with validation framework

**UNIT-V**

**Struts (Cont.,):** Working with Dyna Action Forms , Resource file and internationalization, Working with Action Dispatch, Understanding architecture of Struts 2, Building views and actions, Validation framework, Actions with annotations.

**Web Services:** Understanding SOA and WS, Services, descriptions, and messaging, Coordination, Orchestration, and Choreography, Advanced Messaging, Metadata, and Security, Service Orientation Principles, Application and Business Layers, Service Orientated Analysis, SOA Design – WSDL and SOAP, Service Design, WS-BPEL, WS-\* Extensions.

**Text Books:**

1. Head First Servlet & JSP by Bryan Basham, Bert Bates, Kathy Sierra
2. The J2EE 1.4 Tutorial: Eric Armstrong , Jennifer Ball, Stephanie Bodoff, Debbie Bode
3. Carson, Ian Evans, Dale Green, Kim Haase, Eric Jendrock.
4. Struts 2 in Action: Donald Brown, Chad Michael Davis, and Scott Stanlick. May, 2008

**Reference Book:**

1. J2EE complete Reference

L	T	P	C
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**Aim and Objective :** To make the students learn the formation of sentences and improve the communication skills.

### UNIT-I

**Features of Indian English :** Correction of sentences - Structures - Tenses - ambiguity - idiomatic distortions.

### UNIT-II

**Informal conversation Vs Formal expression :** Verbal and non-verbal communication, barriers to effective communication

### UNIT - III

**Types of Communication :** Oral, aural, Writing and reading - Word-Power - Vocabulary- Jargon - rate of speech, pitch, tone - Clarity of voice

### UNIT - IV

**Formal and informal interviews :** ambiance and polemics - interviewing in different settings and for different purposes e.g., eliciting and giving information, recruiting, performance appraisal.

### UNIT – V

**Technical presentations :** types of presentation –video conferencing-- participation in meetings - chairing sessions. Letter-writing - business letters – pro forma culture - format - style – effectiveness, promptness - Analysis of sample letters collected from industry - email.

**Text Books :**

1. Essentials of Business Communication, Rajendra Pal, J S KorlahaHi : Sultan Chand & Sons, New Delhi.
2. Advanced Communication Skills, V. Prasad, Atma Ram Publications, New Delhi.

**Reference Books :**

1. Business Communication, RK Madhukar, K.R. Lakshminarayana , Vikas Publishing House Pvt Ltd
2. Edmond H Weiss: Writing Remedies: Practical Exercises for Technical Writing, Universities Press, Hyderabad

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester**  
**Elective-I - THEORY OF COMPUTATION**

L	T	P	C
3	1	0	4

**SPRCA421**

**Aim and Objective :** To introduce to the theory of computation, including models of computation such as Turing machines, theory of programming languages, including grammars, parsing, syntax and semantics. To learn about a variety of issues in the mathematical development of computer science theory, particularly finite representations for languages and machines, as well as gain a more formal understanding of algorithms and procedures.

**UNIT-I**

**Introduction To Finite Automata:** Alphabets and languages- Finite Representation of Languages. Deterministic Finite Automata – Non-deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Properties of the Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Proofs of those Languages Are and Are Not Regular.

**UNIT-II**

**Context Free Languages :** Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – Closure Properties – Periodicity Properties – Determinism and Parsing – Deterministic Pushdown Automata and Context – Free Languages – Top- down Parsing – Bottom – Up parsing.

**UNIT-III**

**Turing Machines :** The Definition of Turing Machine – Computing with Turing Machines – Combining Turing Machines – Some Examples of More Powerful Turing Machines.

**UNIT-IV**

**Church Thesis :** Church’s Thesis – The Primitive Recursive functions – Godelization – The  $\mu$ -Recursive Functions – Turing – Computability of the  $\mu$ -Recursive functions – Universal Turing Machines.  
**Uncomputability:** The Halting Problem – Turing- Enumerability, Turing – Acceptability, and Turing - Decidability – Unsolved problems about Turing machines and  $\mu$ -Recursive Functions- Post’s correspondence problem.

**UNIT-V**

**Computational Complexity :** Time-bounded Turing Machines – Rate of Growth of functions – Time-Bounded simulations – The Classes P and NP – NP-Completeness – Some NP-complete Problems – Integer Programming – The Travelling Salesman Problem.

**Text Book:**

1. Elements of the Theory of Computation, Harry R Lewis, Christos H. Papadimitriou , Prentice-Hall of India Private Limited, New Delhi

**Reference Books :**

1. Introduction to Automata Theory, Languages, and Computation, Hopcroft. J.E and J.D. Ullman., Addison-Wesley, Reading, Mass. 1979.
2. An Introduction to Formal Languages and Automata, P. Linz and Jones, 4<sup>th</sup> Edition, Bartlett Publisher, Sudbury, Massachusetts, 2006.

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### UNIT- I

Problems and Search: What is Artificial Intelligence?, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success, Some General References, One Final Word. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems.

### UNIT-II

Heuristic Search Techniques: Generate-and- Test, Hill Climbing, Best- First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis. Knowledge Representation:- Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation, The Frame Problem.

### UNIT-III

Using Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. Representing Knowledge Using Rules:- Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

### UNIT-IV

Symbolic Reasoning under Uncertainty:- Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem solver, Implementation: Depth-First Search, Implementation: Breadth\_First Search. Statistical Reasoning:- Probability and Baye's Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

### UNIT-V

Weak Slot-and-Filler Structures:- Semantic Nets, Frames.

Strong Slot-and Filler Structures: Conceptual Dependency, Scripts, CYC. Knowledge Representation Summary :- Syntactic-Semantic Spectrum of Representation, Logic and Slot-and-Filler Structures, Other Representational Techniques, Summary of the Role of Knowledge.

**Text Book:**

1. Artificial Intelligence, Elaine Rich, Kevin Knight, 2<sup>nd</sup> Edition Tata McGrawHill

**Reference Books :**

1. Artificial Intelligence – A modern approach , Stuart Russel, Peter Norwig, Pearson Education.
2. Artificial Intelligence-Structures And Strategies For Complex Problem Solving, George F. Luger Pearson Education / PHI, 2002.

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester**  
**Elective-I – COMPUTER GRAPHICS**

**SPRCA423**

L	T	P	C
3	1	0	4

**Aim and Objective:** The Objective of the courses to teach the students the fundamentals of Computer Graphics which will help the student to learn out design and develop optimal graphics algorithms with the optimal storage requirement.

**UNIT-I**

**Introduction to computer graphics-** Introduction, Non interactive/interactive Graphics, Uses of computer graphics, Classification of Applications, Programming Language, Graphics and Operating software, Graphic Systems Configuration.

**Graphic Systems-**Introduction, Cathode Ray Tube(CRT)basics, Refresh Display, Direct View Storage Tube(DVST), Raster Display, Input devices, Output devices, Computer Graphic Software, Integration of Graphics Standard, Interactive Graphic Techniques, Graphical User Interface.

**UNIT-II**

**Output Primitives-** Introduction, Representing Image, Straight Line, Line drawing algorithms, Differential Digital Analyser(DDA)algorithm, Bresenham's Line Algorithm, Circle generating Algorithm, Bresenham's circle Algorithm, Midpoint circle Algorithm, Ellipse Generating Algorithm, Midpoint Ellipse Algorithm, Polygon filling Algorithms, Character or Text Generation, Aliasing and Anti alising

**UNIT-III**

**Two Dimensional Transformations-**Introduction, Representation of points, Matrix Algebra and Transformation, Transformation of points, Transformation of straight line, Midpoint Transformation, Transformation of Parallel Lines, Transformation of Intersecting Lines, Rotation, Reflection and Scaling of Straight Line or Polygons, Combined Transformation, Translation and Homogeneous Coordinates, Rotation about an Arbitrary point, Reflection about an Arbitrary Line.

**Window Clipping-** Introduction, Viewing Transformation, Clipping, Point Clipping, Line Clipping, Cohen-Sutherland Line clipping, Parametric Liang-Barsky 2D Line Clipping Algorithm, Polygon Clipping, Sutherland-Hodgman Algorithm, Curve Clipping, Text Clipping

**UNIT-IV**

**3D Concepts and Techniques-** Introduction, 3D Transformations, Rotation about an axis Parallel to a Coordinate Axis, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, 3D Modelling Schemes, Projection, Orthographic Projection, Isometric Projection, Oblique Projection, Perspective Projection, One Two and Three point Perspective, Viewing Parameters, Object Coordinate Conversion to View Plane Coordinate, 3D Clipping, View Volume.

**UNIT-V**

**Animation and Multimedia-**Introduction to Animation, Devices for Producing Animation, Computer Assisted Animation, Video Formats, Frame-by-Frame Animation Techniques, Real-Time Animation Techniques , Animation Software. Introduction to Multimedia, visual Elements, Sound Elements, Multimedia Storage.

**Text Book:**

1. Computer Graphics- Amarendra N Sinha, Arun D Udai, Tata McGraw Hill

**Reference Books:**

1. Computer Graphics 2<sup>nd</sup> Edition Donald Hearn, M. Pauline Baker Prentice Hall
2. Procedural Elements for Computer Graphics, David F. Rogers, Tata McGraw Hill New Delhi, 2003

L	T	P	C
3	1	0	4

**Aim:** To enable the student to understand the systems programming.

#### UNIT-I

Introduction to grammars, languages, finite state machines, Introduction to Systems Programming, Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register.

#### UNIT-II

Introduction to Assembler, databases used in assembler design, Design of Assembler - Single Pass & Double Pass.

#### UNIT-III

Introduction to Macros, various types of Macros, Design of Macro Processor – Single Pass & Double Pass.

#### UNIT-IV

Introduction to Loaders, functions of a loader, types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL.

#### UNIT-V

Introduction to compilers: a brief discussion on various phases of compilers. Applications of FSM and grammars in compiler design.

Introduction to Software Tools, Text editors, Interpreters, Program Generators, Debug Monitors.

#### Text Book:

1. Systems Programming, Donovan, Tata Mc Graw Hill

#### Reference Books :

1. System Programming, Dhamdhare (IInd Revised Edition), Tata Mc Graw Hill
2. System Software, Leland. L. Beck, Pearson Education.

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**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester**  
**UML LAB**

**SPRCA411**

**Aim and Objective :** The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, Rational Products. The course is realized as a project-like assignment that can, in principle, be done by a team of three/four students working full time. Typically the assignments have been completed during the semester requiring approximately 80-120 hours from each project team.

The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Extensive hardware expertise is not necessary, so proportionate attention can be given to the design methodology.

Despite its apparent simplicity, the problem allows plenty of alternative solutions and should be a motivating and educating exercise. Demonstration of a properly functioning system and sufficient documentation is proof of a completed assignment

**Projects**

- Term projects are projects that a group student or might take through from initial specification to implementation.

The project deliverables include:

- Documentation including
  - A problem statement
  - A requirements document
  - A software/Hardware Requirements
  - A Requirements Analysis Document. RAD
- A design document
  - A Software Design Description and a System Design Document.
  - An Object design
  - A object design document(ODD)
- A sample Screen.
- A sample test specification.

**Reference Books:**

1. Project-based software engineering: An Object-oriented approach, Evelyn Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modelling with Rational Rose 2002 and UML, Terry Quatrini, Pearson Education
3. UML2 Toolkit, Hans-Erik Eriksson, etc; Wiley

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1. Write an HTML document to display the word “WEBDESIGNING” in horizontal Scrolling format.
2. HTML document to demonstrate Ordered Lists, Unordered Lists, Nested Lists.
3. Write an HTML document to divide the window into two halves using frames.
4. Write an HTML document to demonstrate tables.
5. Write a JavaScript program to read the customer name and perform manipulations, addition of 2 numbers, display a greeting message
6. Program on JDBC for insertion, deletion, updation of data in the database.
7. Program for Multiple Insertions, Multiple Deletions, Multiple Updations of data in the database.
8. Program on Prepared Statement and Callable Statements.
9. Program on Transition Processing.
10. Program to create a login page using HTML and check the Database values in Servlet using JDBC.
11. Program to create a Filter in Servlets.
12. Program to create a session in Servlets.
13. Web Page Creation using JSP
- 14 Program for using custom Tags
15. Programs for using Standard Library Tags (SLT).
16. JSP Pages involves JDBC Connectivity.
17. Program to create a login page using JSP and check the values of Database in Servlets using JDBC.

**Text Book:**

1. J2EE Complete Reference.



**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester**

<b>L</b>	<b>P</b>	<b>C</b>
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**SPRCA413**

**SEMINARS AND TECHNICAL WRITING**

**Aim and Objective:** To improve the ability of learning new things and to have up-to-date knowledge on the technology.

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) IV Semester**

<b>L</b>	<b>P</b>	<b>C</b>
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**SPRCA414**

**COMPREHENSIVE VIVA**

**Aim and Objective :** The comprehensive viva will be conducted to assess the student understanding in various subjects studied during the semester

## **FIFTH SEMESTER**

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester  
CLOUD COMPUTING**

**SPRCA501**

L	T	P	C
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**Aim and Objective :** The aim is to educate the students about various facts of Cloud Computing. The objective is to discuss features such as cloud computing basics, architecture, components, behaviour, platforms, user's perspective, security, SaaS model, EaaS model, migration. Introduction technologies and tools for cloud computing.

**UNIT-I**

**Introduction to Cloud Computing:** Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.

**Migrating Into a Cloud:** Introduction, Broad approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud

**UNIT-II**

**Enriching the 'Integration as a Service' Paradigm for the Cloud Era:** An Introduction, The Outset of Knowledge Era, The Evolution of SaaS, The Challenges of SaaS Paradigm, Approaching the SaaS Integration Engima, New Integration Scenarios, The Integration Methodologies, SaaS Integration Products and Platform, SaaS Integration Services, Business-to-Business (B2B) services, A Framework of Sensor-Cloud Integration, SaaS Integration Appliance.

**The Enterprise Cloud Computing Paradigm:** Introduction, Background, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers Toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain

**UNIT-III**

**Virtual Machines provisioning and Migration Services:** Introduction and Inspiration, Background and Related work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context

**On the Management of Virtual Machines for Cloud Infrastructures:** The Anatomy of Cloud Infrastructures, Distributed Management of Virtual Infrastructures, Scheduling Techniques for Advance Reservation of Capacity, Capacity Management to meet SLA Commitments

**UNIT-IV**

**Aneka-integration of Private and Public Clouds:** Introduction, Technologies and Tools for Cloud Computing, Aneka Cloud Platform, Aneka Resource Provisioning Service, Hybrid Cloud Implementation.

**CometCloud:** An Autonomic Cloud Engine: Introduction, CometCloud Architecture, Autonomic Behavior of CometCloud, Overview of CometCloud-based Applications, Implementation of Evaluation

**UNIT-V**

**Data Security in the Cloud:** An Introduction to the Data Security, The Current State of Data Security in Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, The Cloud, Digital Identity and Data Security, Content Level Security-Pros and Cons

**Secure Distributed Data Storage in Cloud Computing:** Introduction, Cloud Storage from LANs, TO WANs, Technologies for Data Security in Cloud Computing.

**Text Book**

1. Cloud Computing Principles and Paradigms, Raj Kumar Buyya, James Broberg, Anderzej Goscinsinski  
WILEY Publications

**Reference Books:**

1. Cloud Computing Explained John Rhoton , 2nd Edition, Recursive Press
2. Cloud Computing: Technologies and Strategies for ubiquitous Data center, Brain J.S. Chee and Curtis Franklin Jr., CRC Press

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**  
**IMAGE PROCESSING**

SPRCA502

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**Aim and Objective :** To enable the students to understand the various image models, restoration of images, segmentation of images and concepts of image compression.

**UNIT-I**

**Fundamentals of Image Processing:** Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels, distance measures, connectivity, Image Geometry, Photographic film

Histogram: Definition, decision of contract basing on histogram, operations basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization.

**UNIT-II**

**Image Transforms:** Discrete Fourier Transform, Some properties of the two-dimensional fourier Transform last fourier transform, Inverse FFT.

Image Enhancement , Spatial domain methods, Frequency domain methods, Enhancement by point processing, Spatial filtering, Lowpass filtering, Highpass filtering, Homomorphic filtering, Colour Image Processing.

**UNIT-III**

**Image Restoration :** Degradation model, Diagonalization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain., Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.

**UNIT-IV**

**Image Segmentation :** Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

**UNIT-V**

**Morphology:** Dilation, Erosion, Opening, Closing, Hit-and Miss transform, Boundary extraction, Region filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray-Scale Images. Application of Morphology in I.P. Recognition and Interpretation : Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretatiion.

**Text Books:**

1. Digital Image Processing, Rafael C. Gonzalez & Richard E. Woods, AWL.
2. Fundamental of Digital Image Processing, A.K. Jain, PHI.

**Reference Books:**

1. Digital Image Processing and Analysis , B. Chanda & D. Dutta Majumber , PHI
2. Image Processing in C , Dwayne Phillips , BPB Publications

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**  
**DATA MINING & DATA WAREHOUSING**

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**SPRCA503**

Aim and Objective: The Course is designed to meet the challenges of developing large data warehouses, as the industrial market is moving towards customers satisfaction and relationship intelligence will have to be embedded in business. The focus is mainly on the concepts of very large databases and their applications. The objective is to introduce the basic concepts of data warehouses, the design and tuning its performance. Concepts of knowledge discovery in databases is also given importance

**UNIT – I**

**Introduction:** Motivation and importance, What is Data Mining? Kind of data on which mining is done, Data mining Functionalities, Classification of Data mining systems, Are all patterns interesting, Data mining task primitives Integrating Mining System with Database or Warehouse System, Major Issues of Data mining System

Data Preprocessing : Why Pre-process the Data? Descriptive data summarization Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT – II**

Data Warehouse and OLAP Technology for Data Mining : What is a Data Warehouse? Multi-dimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining

Data Cube Computation and Data Generalization :

Efficient methods for Data Cube Computation, Further development of Data Cube and OLAP Technology,

**UNIT – III**

Alternate method of Generalization & Description : Attribute oriented Induction.

Mining Frequent patterns, Associations and Correlations : Basic Concepts, Efficient and scalable frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-based Association Mining.

**UNIT – IV**

**Classification and Prediction** : Concepts and Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule based Classification, Classification by Backpropagation, Support Vector Machines , Associative Classification , Lazy Learners, Other Classification Methods Generic Algorithms, Rough Set Approach, Fuzzy Set Approaches, Prediction, Accuracy and error measures, Evaluating accuracy of classifier or predictor, Ensemble Methods , Model Selection.

**UNIT V**

**Cluster Analysis** : What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-based Methods, Grid-based Methods, Model-based Clustering Methods, Clustering high dimensional data, Constraint based Cluster analysis, Outlier Analysis.

Mining Stream, Time Series and Sequence Data : Mining Data streams, Mining Time Series Data, Mining Sequence patterns in Transactional Data Bases, Mining Sequence Patterns in Biological Data

**Text Book:**

1. Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, 2<sup>nd</sup> Edition, Morgan Kaufman Publications.

**Reference Books:**

1. Introduction to Data Mining, Pang- Ning Tan, Michael Steinbach, Vipin Kumar, Low Price Edition, Pearson Education.
2. Data Mining: Introductory and Advanced Topics, Margaret H. Dunham, 2003, Prentice Hall.

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**Aim and Objective :** To enable the student to understand the data types, different components and also concepts of Object Oriented Programming. Also introduces the students to work with forms and boxes in .NET and also accessing the data with server.

**UNIT – I**

**Fundamentals of Visual Basic:** Variables -Declaring variables, Data Type of variables, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions Exception handling, windows forms, MDI forms, handling events.

**UNIT – II**

**Windows Forms:** Different Types of Boxes, Labels, Buttons, Panels, group boxes, list boxes, combo boxes, picture box, scroll bars, splitters, track bars, notify icons, tool tips.

Different types of Menus menu items, context menus types of dialog boxes.

**UNIT – III**

**Object-Oriented Programming:** Classes and objects constructors and destructors, inheritance, Interfaces, Polymorphism, Late Binding, Graphics handling and File handling.

**UNIT - IV**

**Web Forms:** Working with web forms, Web forms and HTML, The Web control class, Web Forms and Boxes, Validation Controls, Ad Rotators, Web Forms and HTML controls.

**UNIT - V**

**Data Access with ADO.NET:** Accessing data with the server explorer, Data adapters and Data sets, Binding Controls to databases, Handling databases in code,

**Text Book :**

1. VB.NET Programming (Block Book) Steven Holzner (Dreatech-2003)

**Reference Books:**

1. VB.NET Programming by T. Gaddis (Dreamtech)
2. Microsoft Visual Basic. Net step by step Halvorsen (PHI)
3. OOP with Microsoft Visual Basic .Net Reynold Hacttte (PHI)

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**SPRCA522 MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**  
**ELECTIVE II - TCP/IP PROTOCOL SUITE**

**Aim and Objective :** To introduce the different network models, different types of networks, network addressing, different protocols and the concepts of multicasting protocols which involves multimedia.

**UNIT-I**

**Introduction and Overview.** Comparison of OSI Model and TCP/IP model. Networking Technologies: LANS, WANS, Connecting Devices. Internetworking concept and Architectural model. Internet Backbones, NAP, ISP's, RFC's, Internet Standards.

**UNIT-II**

**Internet Addresses:** IP address classes, subnet mask, CIDR, ARP,RARP, Internet Protocol, Routing IP Datagrams, ICMP and IGMP.

**UNIT-III**

**UDP, TCP, Sockets** and socket Programming, Routing in Internet, Routing protocols- RIP, OSPF and BGP. Introduction to Multicasting and Multicast routing.

**UNIT-IV**

**Host Configuration:** BOOTP, DHCP; Services: Domain Name System, FTP, TFTP and Electronic Mail: SMTP, MIME, IMAP, POP.

**UNIT-V**

**Network Management :** SNMP, WWW: HTTP, Mobile IP. Multimedia : RTP, RTCP.

**Middlewares :** RPC, RMI. Introduction to IPv6 and ICMPv6,

**Internet Security :** IPsec, PGP, Firewalls, SSL.

**Text Books:**

1. Internetworking and TCP/IP: Principles, Protocols and Architectures, Douglas Comer, Pearson Education.
2. TCP/IP Protocol Suite, Behrouz A. Forouzan, Third Edition, TMH.

**Reference Books:**

1. Stevens W. R. TCP/IP Illustrated, volume 1,2,3, Pearson education.
2. Computer Networking – A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Pearson Education, Asia.



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**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**  
**SPRCA523 ELECTIVE - II - SOFT COMPUTING METHODOLOGY**

**Aim and Objective :** To introduce to the theory of neural networks, fuzzy logic, genetic algorithm and different applications of soft computing

**UNIT – I**

**Introduction:** Neural Networks, Application Scope of Neural Networks, Fuzzy Logic, Genetic Algorithm, Hybrid Systems, Soft computing.

**Artificial Neural Network:** Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural network, Important terminologies of ANNs, McCulloch-Pitt Neuron, Linear Separability, Hebb Network.

**UNIT– II**

**Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets:** Introduction to Fuzzy Logic, Classical Sets, Fuzzy Sets.

**Classical Relations and Fuzzy Relations:** Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, Noninteractive Fuzzy Sets.

**Membership Functions:** Introduction, Features of the Membership functions, Fuzzification, Methods of Membership Value Assignments

**Fuzzy Arithmetic and Fuzzy Measures:** Introduction, Fuzzy arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness, Fuzzy Integrals

**UNIT – III**

**Fuzzy Rule Base and Approximate Reasoning:** Introduction, Truth Values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Fuzzy Reasoning, Fuzzy Inference Systems.

**Fuzzy Decision Making:** Introduction, Individual Decision Making, Multiperson Decision Making, Multiobjective Decision Making, Multiattribute Decision Making, Fuzzy Bayesian Decision Making

**Fuzzy Logic Control Systems:** Introduction, Control System Design, Architecture and Operation of FLC system Models, Application of FLC System

**UNIT- IV**

**Genetic Algorithm:** Introduction, Biological Background, Traditional Optimization and Search Techniques, Genetic Algorithm and Search Space, Genetic Algorithm vs Traditional Algorithm, Basic Terminologies in Genetic Algorithm, Simple GA, General Genetic Algorithm, Operators in Genetic algorithm, Stopping Condition for Genetic Algorithm Flow, Constraints in Genetic Algorithm, Problem solving Using Genetic Algorithm, The Schema theorem, Classification of Genetic Algorithm, Holland Classifier Systems, Genetic Programming, Advantages and Limitations of Genetic Algorithm.

**UNIT - V**

**Hybrid Soft Computing Techniques:** Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems, Simplified Fuzzy ARTMAP

**Applications of Soft Computing:** Introduction, A Fusion Approach of Multispectral Images with SAR Image with Area Analysis, Optimization of Traveling Salesman Problem using Genetic Algorithm Approach, Genetic Algorithm-Based Internet Search Technique, Soft Computing Based Hybrid Fuzzy Controllers, Soft Computing Based Rocket Engine Control.

**Text Book:**

1. Principles of Soft Computing, S.N.Sivanandam and S.N.Deepika, 2<sup>nd</sup> Edition, Wiley Publications, India.

**Reference Books:**

1. Soft computing and intelligent systems design theory, tools and applications, Fakhreddine karray and clarence de silva, Addison wesley publishing, August 2004
2. Soft Computing: Methodologies and Applications Hoffmann, F.; Köppen, M.; Klawonn, F.; Roy, R. (Eds.) Springer publications

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**Aim and Objective :** The course aims to cover the concepts of embedded systems, their design and applications, programming models and inter process communication. The students would be able to understand the use of embedded systems, device drivers, software engineering practices in embedded systems development and inter process communication.

#### UNIT-I

**A First Look at Embedded Systems:** Examples of Embedded systems and Typical Hardware

**Hardware Fundamentals for the Software Engineer:** Terminology, Gates a few other basic considerations, timing diagrams and memory.

#### UNIT-II

**Advanced Hardware Fundamentals** -Microprocessors ,Buses, Direct Memory Access, Interrupts, Other Common Parts, Built-Ins on the Micro processor.

**Interrupts**-Microprocessor Architecture, Interrupt Basics, The Shared Data problem, Interrupt latency.

#### UNIT-III

**Survey of Software Architectures-** Round-Robin, Round Robin with Interrupts, Function-Queue\_ scheduling Architecture, Real-time Operating System Architecture, Selecting Architecture

**Introduction to Real-Time Operating Systems-** Tasks and Task States, Task and Data, Semaphores and Shared Data.

#### UNIT-IV

**More Operating System Services-** Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

**Basic Design Using a Real-Time Operating System-**Principles, An Example, Encapsulation Semaphores and a Queues, Hard Real Time Scheduling Considerations, Saving Memory Space, Saving Power.

#### UNIT-V

**Embedded Software Development Tools-** Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System.

**Debugging Techniques-**Testing on Your Host Machine, Instruction Set Simulators, The assert Macro, Using Laboratory Tools .

#### **Text Books:**

1. An Embedded Software Primer, David A. Simon, Pearson Education, Inc., 1999

#### **Reference Books:**

1. Embedded Systems Design – A Unified Hardware/Software Introduction, Frank Vahid/ Tony Givargis, John Wiley & Sons, Inc., 2002
2. Embedded Systems, Architecture, Programming and Design, Raj Kamal, TMH, 2003

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**Aim and Objective :** To introduce to the concepts of real time systems and the objective is the student should be able to know the task assignment, scheduling and real time communication.

#### **UNIT-I**

**Introduction to real time systems**, structure, issues, task classes, performance measures for real time systems-their properties, traditional measures, cost functions and hard deadlines. Estimation of program run time-source code analysis, accounting for pipelining and caches.

#### **UNIT-II**

**Task Assignment and Scheduling**-Rate monotonic scheduling algorithm, Preemptive earliest deadline first algorithm, Using primary and alternative tasks. Task Assignment-Utilization balancing algorithm, next fit for RM(Rate monitoring) scheduling, Bin packing assignment algorithm for EDF, Myopic offline scheduling(MOS) algorithm, Focused addressing and bidding(FAB) algorithm, Buddy strategy, Assignment with precedence conditions.

#### **UNIT-III**

**Programming Languages & Tools**- Desired language characteristics,, data typing, control structures, hierarchical decomposition, packages, run time error handling, Overloading and genetics, Multitasking, Low level programming, Fex, Euclid, Run time support.

#### **UNIT-IV**

**Real time Communication**-Communication media, network topologies. Protocols-Contention based, Token based, Stop-and-Go, Polled bus, Hierarchical round robin, deadline based.

#### **UNIT-V**

**Fault Tolerance Techniques**- Fault, fault types, fault detection, fault and error containment, hardware and software redundancy, time redundancy, information redundancy. Reversal checks, Malicious or Byzantine failures, Integrated failure handling.

**Text Book:**

1. Real Time Systems, C.M Krishna and Kang G. Shin, TMH

**References Books**

1. Real time computer control and introduction, Stuart Bennelt, Pearson education, 2003
2. Real time systems, Jane W.S Liu, Mc-Graw Hill

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester  
ELECTIVE III –ETHICAL HACKING**

SPRCA533

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**Aim and Objective :** The aim of this course is to learn the different concepts relating to hacking and different types of attacks and the objective is to learn how to secure the system by using perl programming language.

**UNIT-I**

**Who is a Hacker anyhow?**

**Hacking Windows:** Bios Passwords, Window Login Passwords, Changing Windows Visuals, Cleaning your Tracks, Internet Explorer Users, Cookies, Netscape Communicator, The Registry, baby sitter programs, Editing Your Operating System by Editing Explorer.exe, The Registry, The Registry Editor, Description of .reg file, Other system files, The Untold, Windows Tips and Tricks, Cleaning Recent Docs Menu and the RUN MRU, Internet Explorer Tricks and Tips.

**UNIT- II**

**Network Hacking:** Telnet, How do I connect to Remote Computers using Telnet? What exactly is an IP Address? Domain Name Systems or DNS, Nslookup, Ports, Port Scanning and Port Surfing, Sockets and Ports, Using Sockets, PING, Tracert, Netstat, Getting Information about a Domain, Port 23, FTP port, How to use Window FTP Client? Different FTP Commands, Common FTP Hacks

**Web Hacking:** HTTP Torn Apart (Port 80), The Get Method, The Post Method, The Head Method, Hacking from your Web Browser, Post Dil Up Screen Hacking, Making your Own Browser, Removing banners from Free ISPs, Creating Your own 'Difficult to Detect' Port Scanner, How to make your own Key Logger, Removing Banners from Free Web Page Hosting Services, GEOCITIES, TRIPOD, XOOM, Removing Pop Up Banners, Getting a FREE.COM registration, Blue Death, Device Drivers

**UNIT- III**

**Password Hacking:** Passwords, password cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, internet connection password, Window NT Password, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other passwords, Remote access sharing password decoding tutorial, Breaking the DES algorithm, Cracking Wingate Passwords, Cracking the ICQ Password, Cracking the Netzero Free ISP Dial up Password, Cracking Cisco router passwords, Default Passwords, Bypassing the Dial up Server Passwords, Default Passwords, Bypassing the Dial up Server Password.

**UNIT- IV**

**Buffer Overflow Attacks:** Working, Types of Buffer overflows, Stack overflows, Heap overflows, Integer overflows, More examples of Buffer overflows, Basic Programming Errors, Oversized Message Header MSN Bug Buffer Overflow, Format String Bug in wu-ftpd 2.6.0, Countermeasures.

**Privacy Attacks:** Trojan Attacks, Detection, Countermeasures, Keylogger Attacks, Working, Countermeasures.

**Denial (DOS) Attacks :** Ping of Death, DOS Attacks, Teardrop, SYN Attack, Smurf Attacks, UDP flooding, Distributed DOS attacks, Asymmetric Traffic from Mac OS 9, Trinoo or trin00, Tribe Flood Network or TFN, Stacheldraht, Tribal Floodnet 2K, Mstream, Protecting your Systems.

**UNIT - V**

**Viruses Torn Apart:** What is a Virus? Boot Sector Viruses, File or Program Viruses, Multi Partite Viruses, Stealth Viruses, Polymorphic Viruses, Macro Viruses, Blocking Direct Disk Access, Recognizing Master Boot Record Modifications, Identifying Unknown Device Drivers, How do I make my own Virus? Macro Viruses, Using Assembly to Create your own Virus, How to modify a Virus so Scan won't Catch it how to Create New Virus Strains, Simple Encryption Methods.

**The Perl Programming Language**

**Text Book**

1. An unofficial guide to Ethical Hacking, Ankit Fadia, 2<sup>nd</sup> Edition, Ethical hacking series.

**Reference Book:**

1. Hand-On Ethical Hacking and Network Defense, Michael T. Simpson, Kent Backman, James Corley

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SPRCA511

DATAMINING LAB

1. Develop an application to implement defining subject area, design of fact dimension table, data mart
2. Develop an application to implement OLAP, roll up, drill down, slice and dice operation
3. Develop an application to construct a multidimensional data.
4. Develop an application to implement data generalization and summarization techniques.
5. Introduction to exploratory data analysis using R
6. Introduction to regression using R
7. Introduction to the Weka machine learning toolkit
8. Performing data preprocessing for data mining in Weka
9. Classification using the Weka toolkit
10. Performing clustering in Weka
11. Association rule analysis in Weka
12. Data mining case study

**Reference Books:**

1. Data Mining: Practical Machine Learning Tools and Techniques (Third Edition)  
By Ian H. Witten, Eibe Frank, Mark A. Hall Morgan Kaufmann January 2011
2. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling (Second Edition)  
By Ralph Kimball

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**SPRCA512**

**INTERNET AND MOBILE APPLICATIONS LAB**

1. A sample program using JSF.
2. Design a Registration page Using Conversion Model and Validation Model.
3. Develop a Program For Event and Listener Model.
4. Data Access and JSF data table and column components.
5. Develop a Hello World program Using Struts.
6. Develop a program using DynaActionForm.
7. Develop a program using Validation in Struts.
8. Develop a program using Exception Handling.
9. Develop a program using Struts Tiles.
10. Develop a program using DispatchAction.
11. Develop a program using Webservices.

**Reference Books:**

1. J2EE complete Reference.
2. Struts 2 in Action: Donald Brown, Chad Michael Davis, and Scott Stanlick. May, 2008

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**

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**SPRCA513**

**INDUSTRIAL TRAINING**

**Aim and Objective:** To expose students to real situations of operation processes, development and management of work place

**MASTER OF COMPUTER APPLICATIONS (M.C.A.) V Semester**

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**SPRCA514**

**COMPREHENSIVE VIVA**

**Aim and Objective :** The comprehensive viva will be conducted to assess the student understanding in various subjects studied during the semester



## **SIXTH SEMESTER**

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**Aim and Objective:** To introduce students to the concept of wireless communications. Emphasize is on working of various layers in a wireless medium, insight into WAP, WML, wireless telephony application.

#### UNIT – I

**Basics of Wireless Communication :** Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal propagation – Multiplexing modulation – Spread spectrum – Cellular systems. Wireless MAC Layer, Medium access control – Motivation for a specialized MAC – SDMA – FDMA – TDMA – CDMA – comparison of S/T/F/CDMA. Telecommunication systems – GSM – DECT – TETRA – UMTS and IMT – 2000. Satellite systems – GEO 139, LEO 139, MEO 140 – Routing – Localization – Handover – Broadcast systems – Overview – Cyclic repetition of data – Digital audio broadcasting – Digital video broadcasting.

#### UNIT – II

**Wireless LAN & Wireless ATM :** Wireless LAN – Infrared vs. radio transmission – Infrastructure and ad hoc networks – IEEE 802.11 – HIPERLAN – Bluetooth. Wireless ATM – Motivation for WATM – Wireless ATM working group – WATM services – Reference model – Functions – Radio access layer – Handover – Location management – Addressing – Mobile quality of service – Access point control protocol.

#### UNIT – III

**TCP/IP Protocol Suite :** TCP/IP and Networking - Integrating TCP / IP and OSI Network Layers - Exploring IP Addresses - Controlling Network Traffic - Configuring Client Workstations.

**Protocols :** TCP / IP Protocols – Understanding TCP / IP Protocols – Using Mail Protocols – Using Document Delivery Protocols, TCP/IP Services

#### UNIT – IV

**Mobile Network Layer :** Mobile network layer – Mobile IP – Dynamic host configuration protocol – Ad hoc networks. Mobile transport layer – Traditional TCP 292 – Indirect TCP – Snooping TCP – Mobile TCP – Fast retransmit/fast recovery – Transmission/timeout freezing – Selective retransmission – Transaction oriented TCP.

#### UNIT – V

**Wireless Applications :** Support for mobility – File systems – Consistency – Worldwide web – Hypertext transfer protocol – Hypertext markup language – Approaches that might help wireless access – System architecture – Wireless application protocol.

**Text Books:**

1. Mobile Communications,- Jochen Schiller – Addison Wesley , 2<sup>nd</sup> Edition – 2004.
2. Using TCP / IP – John Ray - Special Edition – Prentice hall India – 1999.

**Reference Books:**

1. William Stallings – Wireless Communications and Networks, Pearson Edu, 2<sup>nd</sup> Edition, 2005.
2. Principles of TCP / IP, Douglas Comer, Prentice Hall, 2<sup>nd</sup> Edition, 2002

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**Aim and Objective:** To introduce students the underlying principles and applications of the emerging field of nanotechnology. This also deals with scientific principles and theory relevant at the nanoscale dimension.

#### UNIT – I

**General Introduction:** Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

#### UNIT – II

**Silicon Carbide:** Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles, Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites,

#### UNIT – III

**Mechanical properties:** Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties, Electrical properties: Switching glasses with nano particles, Electronic conduction with nano particles

#### UNIT – IV

**Optical properties:** Optical properties, special properties and the coloured glasses  
 Process of synthesis of nano powders, Electro deposition, Important nano materials,  
 Investigating and manipulating materials in the nanoscale: Electron microscopies, scanning probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.

#### UNIT – V

**NanoMedicines :** Developing of Nanomedicines Nanosystems in use, Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications, Molecular Nanomechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nanotribology applications.

**Text Books:**

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH

**Reference Books:**

1. Nanotechnology: A Gentle Introduction to the Next Big Idea, by Mark A. Ratner, Daniel Ratner, Pearson Education, 2003.
2. Nano Essentials- T.Pradeep/TMH

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**Aim and Objective:** To enable the student to understand the importance of physical security for a network center, describe the encryption technique, various security protection methods, apply audit and trial to ensure transaction security, have the knowledge to design a secure computer network and establish a good security policy in a business environment.

#### UNIT – I

**System Security :** Intruders, Intrusion Detection, Password Detection, Password Management, Malicious Software, Viruses and Related Threats, Virus Countermeasures.

#### UNIT – II

**Firewalls:** Firewall Design Principles, Trusted Systems

**Network Management Security :** Basic Concept of SNMP, SNMP v1 Community Facility, SNMPV3.

#### UNIT – III

**XML Security :** XML Primer, What is XML? Processing XML, Introduction to XML Signatures Part 1 and Part 2.

#### UNIT – IV

**Introduction** to XML Encryption, XML Signature implementation using RSA.

#### UNIT – V

**XML Key Management** Specification and the Proliferation of Web Services.

#### **Text Books:**

1. Network Security Essentials Applications and Standards, By William Stallings Pearson Education Asia, New Delhi
2. XML Security, By Blake Dournace, Tata Mc-Graw-Hill, New Delhi

#### **Reference Books:**

1. Cryptography and Network Security, By William Stallings Pearson Education Asia, New Delhi
2. Secure Xml: The New Syntax for Signatures and Encryption, by Donald Eastlake, Kitty Niles, Addison Wesley publications, 2002

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**Aim and Objective:** To introduce the students about management and it's importance. Various strategies in planning and evaluation. Maintaining relations and how to treat the employees.

#### UNIT-I

**Introduction,** meaning, significance of HRM. Environmental influence, HRM-mission, objective, strategy and tactics, evolution and development.

#### UNIT-II

**HR Planning:** integrated strategic planning, process of HR and control review mechanism, Recruitment: Objective, strategies sources, techniques, process and assessment. Selection, placement and Induction: Procedures, Tests, interviews, Placement & Induction issues.

#### UNIT-III

**Development:** Concept, significance, framework, functions. Performance Appraisal: Concept, objectives, system, and methods feed back and counseling. Employee and Executive Training and Development: Essential ingredients of T&D, Training procedures, selection of techniques evaluation and feedback. Career Planning & Development- Planning and development counseling.

#### UNIT-IV

**Job Evaluation:** Concept, methods, advantages & disadvantages. Reward systems: Terminologies, role of; wage differentiates; mechanism of wage and salary Administration; Executive compensation issues, fringe benefits.

#### UNIT-V

**Introduction,** objective, conditions for Healthy Industrial Relations; Trade unions: functions, role, future. Grievance procedure and Disciplinary procedures. Collective Bargaining, essential conditions for, process of, Indian experience. Industrial conflicts: definition, reasons, resolution machinery. Workers participation in Management.

**Text Books :**

1. Personnel Management, Arun Monappa Tata McGraw Hill, New Delhi, 1996,
2. Essential of Human Resource Management and Industrial Relation, Subba Rao P, Himalaya Publishing House

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**Aim and Objective:** To introduce the students about the importance of testing and also the levels in testing. The course also introduces how to plan a test and also its execution.

#### UNIT - I

**Introduction:** Software Quality, Role of testing, verification and validation, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing , Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management .

#### UNIT – II

**System Integration Testing:** Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Granularity of System Integration Testing, System Integration Techniques, Software and Hardware Integration, Test Plan for System Integration, Off-the-Shelf Component Integration, Off-the-Shelf Component Testing, Built-in Testing

#### UNIT - III

**System Test Categories:** Basic Tests, Functionality Tests, Robustness Tests, Interoperability Tests, Performance Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Documentation Tests.

**System Test Design:** Test Design Factors, Requirement Identification, Characteristics of Testable Requirements, Test Design Preparedness Metrics, Test Case Design Effectiveness

#### UNIT – IV

**System Test Planning And Automation:** Structure of a System Test Plan, Introduction and Feature Description, Assumptions, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones

#### UNIT - V

**System Test Execution:** Preparedness to Start System Testing, Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, First Customer Shipment, System Test Report, Product Sustaining, Measuring Test Effectiveness.

**Software Quality:** Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements

**Text Book :**

1. Software Testing and Quality Assurance: Theory and Practice, Sagar Naik, Piyu Tripathy, Wiley , 2008

**Reference Books:**

1. Effective methods for Software Testing William Perry, Wiley.
2. Software Quality Assurance, Daniel Galin, Pearson Education.

L	T	P	C
3	1	0	4

**Aim and Objective:** This course aims at providing Overall knowledge regarding the concepts of ERP and Supply Chain Management, Access organizational needs towards Supply Chain management and ERP

#### Unit I

Introduction to Enterprise Resource Planning: ERP - Introduction, Evolution of Enterprise applications, What is ERP? Reasons for the growth of the ERP market, Operational advantages of Enterprise Wide Applications, Why do many ERP packages fail ? What are the ERP packages being used now?  
 ERP Modules, Introduction, Finance, Plant Maintenance, Quality Management, Materials Management

#### Unit II

ERP Market and Implementation: Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Company, System Software Associates, Inc. (SSA)QAD, A Comparative Assessment and Selection of ERP Packages and Modules.

ERP implementation lifecycle, issues in implementing ERP packages, pre-evaluation screening, package evaluation, project planning phase, gap analysis, reengineering, configuration, implementation, team training, testing, going live, end-user training, post implementation (Maintenance mode).

#### Unit III

Introduction to Supply Chain management: SCM-Introduction, Objectives, Importance, Process view, Competitive and Supply chain Strategies, Supply chain drives, Transportation information. Designing Supply chain Networks, Role of distribution, Factors influencing distribution, Distribution networks in practice, modeling for supply chain

#### Unit IV

SCM Strategies, Performance: Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics.

Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

#### Unit V

Trends in ERP and SCM:

IT enabled Supply chain Management, Customer Relationship management, Internal Supply chain Management, Supplier Relationship Management, ERP and E-Commerce, Future Directions and trends in ERP, Recent Trends in Supply chain management

#### Text Books

1. Enterprise Resource Planning, Alexis, Leon TMH ,New Delhi:2008

#### Reference Books

1. ERP Demystified, Alexis Leon, TMH, New Delhi:2008
2. Supply chain management, Janatshah., Pearson Publication:2008
3. Supply chain Management – Strategy, Planning and Operation, Sunil Chopra & Peter Meind. Pearson/PHI

**SPRCA611**                      **MASTER OF COMPUTER APPLICATIONS (M.C.A.) VI Semester**  
**PROJECT**

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0	0	12

**Aim and Objective:** To develop and design an individual based model by using UML and implement the same by using any of the programming language of their own choice.