

**UNIVERSITY OF PUNE**  
**Syllabus for Post Graduate Diploma in Computer**  
**Applications (P.G.D.C.A.)**  
**(P.G.D.C.A. Part I From Academic Year 2008-2009,**  
**P.G.D.C.A. Part II From Academic Year 2009-2010)**

**INTRODUCTION:**

- The name of the programme shall be Post Graduation Diploma in Computer Applications (P.G.D.C.A.).
- The P.G.D.C.A. Programme will be a part-time two years Post Graduate Diploma Course in Computer Applications.
- Ordinarily, in each class, not more than 60 students will be admitted.

**ELIGIBILITY FOR ADMISSION:**

A candidate who has either graduated with minimum 45% of marks in the aggregate 40% in case of candidates domiciled in Maharashtra *and* belonging to the (reserved categories) or any Diploma awarded by BTE-post SSC 3 years or post HSC 2 years *and* with 2 years working experience are eligible.

**Admission to MC.M. part II Course**

Students having secured First Class in the P.G.D.C.A. Course would be eligible for admission to the M.C.M. part II course at any Institute.

**NUMBER OF LECTURES AND PRACTICALS:**

Lectures and practicals should be conducted as per the scheme of lectures and practicals.

**ASSESSMENT:**

- The final total assessment of the candidate is made in terms of an internal assessment and external assessment for each course.
- For each paper, 30% marks will be based on internal assessment and 70% marks will be based on external examination unless otherwise stated.
- The division of the 30% marks allotted to internal assessment of theory papers is 10 marks for tutorial work, 10 marks for written test and 10 marks for attendance.

- The internal marks will be communicated to the University at the end of each semester, but before the semester examination. These marks will be considered for the declaration of the results

### **EXAMINATION:**

Examinations shall be conducted at the end of the semester ie. during November and May, However, supplementary examinations will also be held in November and May.

### **STANDARD OF PASSING:**

- Every candidate must secure 40% marks in both internal as well as external examination in each head of passing.
- Reassessment of Internal marks In case of those students who have secured less than passing percentage of marks in internal i.e. less than 40%, the institute will administer a separate internal test. The results of which may be conveyed to the University as the Revised Internal Marks.  
In case the result of the internal test as above, results in lower marks than the original, the original figure of the marks will prevail. In short, the rule is higher of the two figures of the marks. However, the institute will not administer any internal test, for any subject for those candidates who have already scored 40% or more marks in the internal examination.

### **BACKLOG:**

Candidates can keep terms for any semester of P.G.D.C.A., irrespective of the number of subjects in which he/she has failed in the previous P.G.D.C.A. semester examinations.

### **BOARD OF PAPER SETTERS/EXAMINERS:**

For each semester end examination there will be one board of paper setters and examiners for every course. While appointing paper setter/examiners, care should be taken to see that there is at least one person specializing in each unit course.

### **CLASS:**

There shall be numerical marking for each question. At the time of declaration of the result, the marks obtained by a candidate are converted into classes as shown below. The class will be awarded on the basis of aggregate marks scored by the student (i.e. out of 1600), provided he/she has passed in both the internal and external examinations of all the subjects in P.G.D.C.A. Part I, and Part II.

<i>Class</i>	<i>Total Marks</i>
First Class with Distinction	1120 and above
First Class	960 to 1119
Higher Second Class	880 to 959
Second Class	800 to 879
Fail	799 and below

### **MEDIUM OF INSTRUCTION:**

The medium of Instruction will be English.

### **REVISION OF SYLLABUS:**

As the Computer technology is changing very fast, revision of the syllabus should be revised after every 3 years.

### **TEACHING AND PRACTICALS SCHEME:**

Minimum number of 1 and ½ hour sessions.

#### **Semester I**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Marks</b>	<b>Type</b>	<b>Hours</b>
<b>101</b>	<b>Fundamentals of Information Technology</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>102</b>	<b>C Programming</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>103</b>	<b>Soft Skills</b>	<b>100</b>	<b>FI</b>	<b>40</b>
<b>104</b>	<b>Practicals</b>	<b>100</b>	<b>FI</b>	<b>60</b>

#### **Semester II**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Marks</b>	<b>Type</b>	<b>Hours</b>
<b>201</b>	<b>Visual Basic</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>202</b>	<b>Java</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>203</b>	<b>DBMS</b>	<b>100</b>	<b>FI</b>	<b>40</b>
<b>204</b>	<b>Practicals</b>	<b>100</b>	<b>FI</b>	<b>60</b>

#### **Semester III**

<b>Subject Code</b>	<b>Subject Name</b>	<b>Marks</b>	<b>Type</b>	<b>Hours</b>
<b>301</b>	<b>Software Engineering and Business Process</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>302</b>	<b>Oracle</b>	<b>100</b>	<b>C</b>	<b>40</b>
<b>303</b>	<b>Web Programming</b>	<b>100</b>	<b>FI</b>	<b>40</b>
<b>304</b>	<b>Practicals</b>	<b>100</b>	<b>FI</b>	<b>60</b>

**Semester IV**

Subject Code	Subject Name	Marks	Type	Hours
401	Data Structure and Algorithms	100	C	40
402	PPM & OB	100	C	40
403	Project	100	FI	
404	Practicals	100	FI	60

Note:-

(C) —Compulsory subject to be evaluated by the University.

(FI) —Fully Internal to be evaluated by the Institute.

**Semester –I****Fundamentals of Information Technology [101]**

Sr. No	Chapter Details	Hrs.
1	<b>Computer :</b> Block Diagram of elements of digital computer-their functions. Memory, CPU, I-O devices, Secondary storages, Magnetic Tape, Disk, CD-ROM. Other recent developments-Scanners, Digitizer, Plotters. Hardware and Software. Micro, Mini and Main-frame computers-their features.	4
2	<b>Representation of Data:</b> Binary, Octal, Hexadecimal, BCD, EBCDIC, ASCII Conversions. Simple Additions, Subtractions, Multiplications, Divisions (in Octal and Hexadecimals).	2
3	<b>Boolean Algebra:</b> Algebra Rules and DeMorgans rules. Simplification of equations-simple equations. Logic Circuits-AND, OR, NAND, NOR, Exclusive OR and NOR Truth tables. Gated flip-flops, Registers, Accumulators.	3
4	<b>Introduction to 8086/8088 microprocessors-architecture</b> Base-Data, Address, Control. Introduction to 80286, 80386 and Pentium chips.	4
5	<b>Software:</b> Introduction to Programming, Flowcharts and Algorithms. System software, application software, firmware machine, Assembly, and Higher Level Languages, Stored program Concept.	5

<b>6</b>	<b>Operating System-Introduction:</b> Process management-FCFS, Round Robbin, Priority based. Memory management-segmentation, paging, virtual memory. I-O management-concept of I-O port. File management-FAT, file handling functions. Software and hardware interrupts, I/O and Memory based Addresses, DMA channels.	5
<b>7</b>	<b>File:</b> Concept of file. File organization and accessing techniques-Indexed, Line sequential, Hashed. File handling functions : Sorting, Merging, Indexing, Updating	3
<b>8</b>	<b>Instructions and Addressing Techniques:</b> Instruction execution cycle. Direct, Indirect, Relative, Paging, Indexed	2
<b>9</b>	<b>Broad view of Operating Systems:</b> MS-DOS, UNIX, MS-WINDOWS	5
<b>10</b>	<b>Basic Concept of Networking and Data Communications:</b> Introduction to LAN and basic communication concepts. OSI 7 layers, Topologies, Protocols, Ethernet, Arcnet, TCP/IP	5
<b>11</b>	<b>Introduction to Virus and Vaccines, Applications, DTP, E-Mail and Internet.</b>	2

### Books.

Computers Today 3e: by Sanders.  
Computers: by Trainor & Krasnewich (McGraw Hill).  
Fundamentals of Computing: by Tucker, Cupper, Bradley Epsten, Kelemen (McGraw Hill).  
Operating System Concept: by Peterson Biberachaty.  
Operating System: by Millan Milenkoric.  
Fundamentals of Computers: by Rajaraman.  
Know your PC: by Peter Norton.  
MS-DOS Technical References Manual.  
Microprocessors Systems 8086/8080 family: by Gibson.  
Advanced MS-DOS Programming (Microsoft press).  
Computer Networks: by Andrew S. Tenenbaum.  
Computer Network and Distributed Processing: by James martin.  
Computer Studies : by C.S.French.  
Elements of digital computer: by Thomas Bartee.

## 'C' PROGRAMMING [102]

Sr. No	Chapter Details	Hrs.
<b>1</b>	<b>C Fundamentals</b> C Character Set, Identifiers and Keywords under ANSI C. Data Types, Constants: int, float, double, char. Qualifiers: long, short, unsigned and signed. Escape sequences (like \n,\b etc.). Arithmetic Expressions and different built-in Operators. Pre-processor directives (like #include, #define), concept of header files, Symbolic constants, Comments, sizeof., steps involved in translation of C Program.	<b>3</b>
<b>2</b>	<b>Built-in operators and function</b> Console based I/O and related built-in I/O functions: printf(), scanf(); getch(), getchar(), putchar(), gets(), puts().	<b>2</b>
<b>3</b>	<b>Decision and Case Control Structure</b> <input type="checkbox"/> if statement; if-else construct; use of logical operators and Compound Relational Tests; Nested if statements; The else if construct; the relational operators; the conditional expression (ternary) operator. The Switch Statement with or without break, concept of a case label	<b>2</b>
<b>4</b>	<b>Loop Control Structure</b> Concept of Loop, loops supported by 'C', concept of top tested and bottom tested loops, the for loop statement; Nested for Loop ; for loop variants; the while loop statement; simple and nested while loop, Increment/decrement operators; Use of Break and Continue; the do-while loop, comparison between for, while and do while loops.	<b>3</b>
<b>5</b>	<b>Storage Classes</b> Automatic, Register, Static (local and global), External. Scope rules.	<b>1</b>
<b>6</b>	<b>Arrays</b> Concept of a collection, types of collections supported by 'C', Array collection and its features, concept of indexing, index variable, index type, positional value of a member of array collection, concept of dimension and size of an array, 'C' syntax for declaration of array, name of the array and its type, Referring individual elements, Entering data into an array, reading data from an array concept of Array initialization and list of initializers, size option, Bounds checking, the concept of two dimension arrays and related syntax, similarities between dimension and nesting.	<b>5</b>

7	<b>Character Strings</b> What are strings, standard library string functions like strlen(),strcat(), strcpy(), strcmp() etc.,similarity between string and 1-D array of char.	2
8	<b>Functions</b> Concept of a subprogram, the interface of a subprogram, role of a interface, Arguments of a subprogram, kinds of subprograms supported by C, return statement as an interface, local variables; Default Return type and the type void; Passing values between functions through interfaces; Declaration of function type; iterative and recursive subprograms, Recursion; concept of call by value, call by reference, return and their underlying implementation should be explained, similarities.	5
9	<b>Pointers</b> Concept of Pointers, Pointer as an address variable, concept of a pointer data type and its syntax, built-in address operator, Pointers to existing variables of different data types and their uses, use of indirection operator, the name of the array as a pointer variable, Pointers and Arrays, Pointers arithmetic, use of unary operators (++ , --), One Dimension Arrays and Pointer, concept of array of pointers and simple use, command line arguments for the main.	5
10	<b>Structures</b> Structure as a homogeneous and heterogeneous collection, possible applications, syntax of declaring structure, Initializing structures, structure variables, accessing structure elements using member operator, Arrays of Structures, and array as member of structure, conceptual difference between array and structure collection, Functions and Structures, nested structures, concept of anonymous structures and their use, Concept of self referential structure, pointer as member of structure and pointer to structure use of member selector operator(->), comparison between indirection (*) operator and member selector operator (->), structure as an argument to function and return type of a function.	3
11	<b>Unions</b> Concept of Union collection, Syntax of declaration and its use, comparison of Array, Structure and Union, array of unions and union as a member of structure, structure as a member of union and array as member of union, concept of memory saving and union, union as a generic data type, concept of anonymous union.	2
12	<b>File based I/O</b> Concept of a file, text files in 'C', concept of a predefined FILE pointer and its definition as given in header file stdio.h, meanings of different members of the structure representing FILE, Disk I/O Functions: High level file I/O or standard functions- fopen(), putc(), getc(), fclose(), fgets(),fputs(),feof(), simple file based programs	3

	showing the working of different members of FILE structure.	
<b>13</b>	<b>Dynamic Memory Allocation and Memory functions</b> Concept of dynamic environment as run time environment, concept of dynamic memory management, use of built-in dynamic memory management tools of 'C' viz. malloc(), free(), simple programs using malloc() and free()	<b>1</b>
<b>14</b>	<b>Bitwise Operators</b> Concept of modifying the value using bit shifting, built-in bit shift operators left bit shift operator(<<) and right bit shift operator (>>) their uses, limitations of bitwise operators, use of bitwise relational operators.	<b>2</b>
<b>15</b>	<b>Other features and Miscellaneous functions</b> Use of atof(), atoi(), atol(), toupper(), tolower(), isalnum(), isalpha(), isdigit(),exit().	<b>1</b>

**Rules :**

ANSI C to be followed strictly

Structured programming techniques to be followed

Programs to be coded in 'C' should be preferably from Commerce / management fields.

**Books:**

- *Let us C* by Yashwant Kanetkar
  - *C Programming* by Balgurusamy
  - *Turbo C/C++ - The Complete Reference* by H. Schildt.
  - *Programming in C* by S. Kochan.
  - *Born to code in C* by H. Schildt.
  - *C Programming by Kernighan and Ritchie - 2nd Edition.*
  - *Programming in ANSI C* by Agarwal
- C Programming with Problem Solving* by Jacqueline A Jones, Keith Harro

### Soft Skills [103]

Objectives :

- 1) Reading Skills, Notes taking, Information seeking methods, Report writing, Preparing Presentations, Task Planning, Organizing and Execution
- 2) Self Development, Interpersonal Skills, Problem Solving, decision Making, Conflict Resolution and Task Completion
- 3) Learning techniques, Study habits
- 4) Time matrix, meditation and Yoga, SWOT analysis, Goal setting, Interview techniques, leadership styles, conflict resolution strategies, group discussion
- 5) Communication methods, Presentation methods, selection of Aids
- 6) Time management, stress management, principles of body language, self-motivation, human psychology, leadership principles.



Sr. No	Chapter Details	Hrs.
1	<b>Effective Communication In Business</b> Importance and benefits of effective communication Components of communication The concepts and problems of communication Non-verbal communication	4
2	<b>Writing Skills</b> Writing Different Types of Letters Using Microsoft Word Preparing effective resume Writing reports	4
3	<b>Presentation Skills</b> Preparing presentations Using Microsoft PowerPoint for presentations	2
4	<b>Listening Skills</b> <ol style="list-style-type: none"> <li>i. Listening Skills           <ol style="list-style-type: none"> <li>1. Recognize why listening is important</li> <li>2. Understand how listening is beneficial</li> <li>3. Increase productivity by listening</li> <li>4. Avoid common misconceptions about listening</li> <li>5. Understand the difference between hearing and listening</li> </ol> </li> <li>ii. Analyzing Your Listening Skills           <ol style="list-style-type: none"> <li>1. Understand the need for the listening process</li> <li>2. Identify the different types of listening</li> <li>3. Use critical listening skills</li> <li>4. Eliminate personal filters when listening</li> <li>5. Take effective notes</li> </ol> </li> <li>iii. Listening to Improve Communication           <ol style="list-style-type: none"> <li>1. Understand the importance of responding to a speaker</li> <li>2. Provide effective feedback</li> <li>3. Ask the speaker appropriate questions</li> <li>4. Interpret a speaker's body language</li> <li>5. Use your body language appropriately</li> </ol> </li> <li>iv. Addressing Listening Problems           <ol style="list-style-type: none"> <li>1. Recognize different listening problems</li> <li>2. Listen with an open mind</li> <li>3. Resist distractions while listening</li> <li>4. Avoid complacent listening</li> <li>5. Improve your understanding of a message</li> </ol> </li> </ol>	4

5	<p><b>Communication Skills</b></p> <ul style="list-style-type: none"> <li>i. Communicating with Supervisors <ul style="list-style-type: none"> <li>1. Identify the types of ineffective supervisors</li> <li>2. Interact with an ineffective supervisor</li> <li>3. Select the guidelines for promoting an idea to a supervisor</li> <li>4. Identify the steps necessary to prepare for negotiating a raise with a supervisor</li> <li>5. Negotiate a raise with a supervisor</li> </ul> </li> <li>ii. Communicating with Colleagues and Subordinates <ul style="list-style-type: none"> <li>1. Choose the guidelines for communicating with colleagues</li> <li>2. Identify the proper way to respond to a colleague's idea</li> <li>3. Take the appropriate steps to apologize to a subordinate</li> <li>4. Follow the process for dismissing a subordinate</li> <li>5. Use the appropriate tactics to refuse a subordinate's request</li> </ul> </li> <li>iii. Communicating with Customers and Vendors <ul style="list-style-type: none"> <li>1. Identify the correct process for responding to customer complaints</li> <li>2. Respond to a customer's complaint</li> <li>3. Identify the proper way to reject a vendor's contract without rejecting the vendor</li> <li>4. List the steps for effectively complaining to a vendor in the correct order</li> <li>5. Effectively complain to a vendor</li> </ul> </li> </ul>	4
6	<p><b>Emotional Intelligence</b></p> <ul style="list-style-type: none"> <li>I. Emotional Intelligence and You <ul style="list-style-type: none"> <li>1. Identify reasons Emotional Intelligence is important in the workplace</li> <li>2. Identify strengths of Emotionally Intelligent team leaders and managers</li> <li>3. Apply the LISTEN process in a work environment</li> </ul> </li> <li>II. Emotional Intelligence and Teams <ul style="list-style-type: none"> <li>1. Identify different types of intelligence</li> <li>2. Identify ways to solve internal problems</li> <li>3. Apply the LISTEN process in a team setting</li> </ul> </li> <li>III. Emotional Intelligence and Employees <ul style="list-style-type: none"> <li>1. Identify different management styles</li> <li>2. Identify pitfalls of management</li> <li>3. Identify steps of the LISTEN process</li> <li>4. Use the LISTEN process to integrate yourself with a new group of employees</li> <li>5. Identify ways to create employee loyalty</li> </ul> </li> </ul>	4
7	<p><b>Interview Techniques</b></p> <ul style="list-style-type: none"> <li>• Preparing for an interview</li> <li>• Presenting yourself</li> <li>• Facing the interview panel</li> </ul>	3

	<ul style="list-style-type: none"> <li>• Answering the technical questions</li> </ul>	
8	Microsoft Office <ul style="list-style-type: none"> <li>• Microsoft Word</li> <li>• Microsoft Excel</li> <li>• Microsoft PowerPoint</li> </ul>	15

List of Practicals :

- Use Microsoft Word/Open Office Word for letter writing
- Use Microsoft Word/ Open Office Word for Mail merge
- Use Microsoft Word/ Open Office Word for project documentation inserting indexes and table of contents
- Use Microsoft Excel/ Open Office Spread sheet for preparing tables and charts
- Use Microsoft Excel/ Open Office Spread Sheet for graphs
- Use Microsoft PowerPoint / Open Office Presentation for preparing presentations
- At least one class of yoga (Overcoming Stress)
- Mock interviews
- Group discussions
- Using Proper body language

Learning Resources :

7. Books :

Sr. No.	Author	Title	Publisher
1	Jeanne. E.O	Human learning	Prentice Hall, New jersey
2	Kenneth a kiewra Nelson F. Dubois	Learning to learn	Allyn and Bacon
3	E.H. Megrath	Basic managerial skills for all	Prentice hall of India Ltd.
4	P.D. Kulkarni &B.B. Sharama	Independent study techniques	T.T.T.I.Chandigarh
5	Trevor L. Young	The handbook of project management	Kogan page
6	Michael Davies	Trainer's GuideProject management	Kogan page
7	Elizabeth Hierney	101 ways to better communication	Kogan Page

8	Dean R. Spitzer	Improving individual performance.	Educational technology Pub., New Jersey.
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8. List of Websites :

Sr. No.	Website Address
1	<a href="http://www.mindtools.com/">http://www.mindtools.com/</a>
2	<a href="http://www.educationinfoindia.com/interviewmain.htm">http://www.educationinfoindia.com/interviewmain.htm</a>
3	<a href="http://www.srikumar.com/personality-development/index.htm">http://www.srikumar.com/personality-development/index.htm</a>
4	<a href="http://www.geocities.com/neovedanta/acxxii.html">http://www.geocities.com/neovedanta/acxxii.html</a>

## PRACTICALS [104]

- The practicals should cover programming on the computer related courses 101,103. At least 20 programs assignment should be done by each student. Online tests, Group discussions should be conducted regularly.
- 50 marks will be given on the basis of their online test performance
- 25 marks for the group discussion /presentation and Lab practical book
- 25 marks for attendance for lab sessions

## Semester-II

### Visual Basic 6.0 [201]

- **Objectives :**

Visual Basic 6 is the front end tool which is used for programming in applications like Microsoft Office and is supported by in different flavours by Microsoft Excel and PowerPoint. In fact VBA is used in creating applications of all types, including ActiveX controls, Client Applications, Internet Information Server Application designer, integrated visual database tools and Data Environment, ActiveX Data Objects (ADO) and the Dynamic HTML page designer.

Sr. No	Chapter Details	Hrs.
1	<b>INTRODUCTION TO VB 6.0</b> a. VB Environment i. Menu Bar, Toolbars, Tool Box ii. Project explorer iii. Properties Window	

	<ul style="list-style-type: none"> <li>iv. Form Designer</li> <li>v. From Layout</li> <li>b. VB The language <ul style="list-style-type: none"> <li>i. Variable, Constants, Datatypes, User defined Datatypes</li> <li>ii. Scope of variable(Global, Local, Modular, static)</li> <li>iii. Control Flow Statements(IF, IIF, Select Case)</li> <li>iv. Looping , nesting(Do While, Do until, For, for Each, Exit)</li> <li>v. Arrays</li> <li>vi. User defined Procedure, Functions</li> <li>vii. VB Functions <ul style="list-style-type: none"> <li>1.Date</li> <li>2.Mathematical</li> <li>3.String</li> <li>4.Conversion</li> </ul> </li> </ul> </li> <li>c. Visual Basic Controls from Toolbox <ul style="list-style-type: none"> <li>i. Properties</li> <li>ii. Methods</li> <li>iii. Events</li> <li>iv. Other Controls <ul style="list-style-type: none"> <li>1. Microsoft Windows Common Controls (6.0)</li> <li>2. Microsoft windows Common controls-3(6.0)</li> <li>3. Control Arrays (adding controls at runtime&amp; design time)</li> </ul> </li> </ul> </li> <li>d. Managing Menus <ul style="list-style-type: none"> <li>i. Creating and modifying menu at Design time</li> <li>ii. Programming menu commands</li> <li>iii. Shortcuts keys &amp; menus at runtime</li> </ul> </li> </ul>	<b>20</b>
<b>2</b>	<p><b>VALIDATING AND PROCESSING USER INPUTS</b></p> <p>Overview , Importance , Types of validation, Implementing Form level and field level validations,Text box Properties, Using Events, validate Event</p>	<b>2</b>
<b>3</b>	<p><b>USING DEBUGGING TOOLS</b></p> <ul style="list-style-type: none"> <li>a Types of errors &amp; debug menu <ul style="list-style-type: none"> <li>i Types of errors</li> <li>ii Debug menu</li> </ul> </li> <li>b Testing the application <ul style="list-style-type: none"> <li>i Immediate window</li> <li>ii Using debug and local window</li> <li>iii Setting watch expression</li> </ul> </li> <li>c Implementing error handler <ul style="list-style-type: none"> <li>i How VB Handles the runtime error</li> <li>ii VB error handler</li> </ul> </li> <li>d VB error handling options <ul style="list-style-type: none"> <li>i How VB handles the runtime error</li> <li>ii Disabling the error handler</li> </ul> </li> </ul>	<b>4</b>

	e Inline error handling	
<b>4</b>	<b>DATABASE CONNECTIVITY</b> <ul style="list-style-type: none"> <li>a How VB access data <ul style="list-style-type: none"> <li>i Data access interface</li> <li>ii Relational database concepts</li> </ul> </li> <li>b Introduction to OLE DB &amp; ADO <ul style="list-style-type: none"> <li>i What is OLE DB</li> <li>ii How OLE DB relates to ADO</li> <li>iii SQL Statements</li> <li>iv ADO Data Control <ul style="list-style-type: none"> <li>• Using ADO</li> <li>• Connecting to data source</li> <li>• Binding controls (DataCombo, DataList, DataGrid)</li> </ul> </li> <li>v Coding ADO <ul style="list-style-type: none"> <li>• Creating record set</li> <li>• Adding records in record set</li> <li>• Modify, Delete, Search</li> </ul> </li> <li>vi Data Environment</li> <li>vii Introduction to crystal Report ( 7.0 or above)</li> </ul> </li> </ul>	<b>14</b>

### Books Recommended

MCS D MSCS Training Guide VB 5.0  
Evangelos Petroustos *Mastering Visual Basic 6.0*  
IDG *Visual Basic 6 Programming Black Book*  
Perpy Greg *Visual Basic 6.0 in 21 days*  
Jerke Noel *Visual Basic 6.0 –The Complete Reference*

### BASIC JAVA [202]

**Objectives: -** 1) To learn object oriented concepts.  
2) To understand the fundamentals and to develop the skill of  
Programming in Basic Java

Sr. No	Chapter Details	Hrs.
<b>1</b>	<b>Introduction to JAVA</b> <ul style="list-style-type: none"> <li>• History of Java</li> <li>• Features of Java</li> <li>• JDK Environment</li> <li>• The Java Virtual Machine</li> <li>• Garbage Collection</li> </ul>	<b>1</b>

2	<b>Programming Concepts of Basic Java</b> <ul style="list-style-type: none"> <li>• Identifiers and Keywords</li> <li>• Data Types in Java</li> <li>• Java coding Conventions</li> <li>• Expressions in Java</li> <li>• Control structures, decision making statements</li> <li>• Arrays and its methods</li> </ul>	4
3	<b>Objects and Classes</b> <ul style="list-style-type: none"> <li>• Object Fundamentals</li> <li>• Pass by value</li> <li>• 'this' reference</li> <li>• Data hiding and encapsulation</li> <li>• Overloading</li> <li>• Overriding</li> <li>• Constructors</li> <li>• Finalization</li> <li>• Subclasses (Inheritance)</li> <li>• Relationship between super class object and subclass object</li> <li>• implicit subclass object to super class object Conversion</li> <li>• Dynamic method dispatch</li> </ul>	8
4	<b>Language Features</b> <ul style="list-style-type: none"> <li>• scope rules</li> <li>• static data, static methods, static blocks</li> <li>• all modifiers of class, method, data members and variable</li> <li>• Abstract Classes</li> <li>• Interfaces</li> <li>• Inner classes</li> <li>• Wrapper Classes</li> <li>• packages</li> <li>• Package access</li> <li>• importing packages and classes</li> <li>• user define packages</li> </ul>	8
5	<b>Exception Handling</b> <ul style="list-style-type: none"> <li>• Types of Exceptions</li> <li>• try, catch, finally, throws keywords</li> <li>• creating your own exception</li> <li>• exceptions and Inheritance</li> </ul>	3
6	<b>Multithreading</b> <ul style="list-style-type: none"> <li>• Multithreading Concept</li> <li>• Thread Life Cycle</li> </ul>	1

<b>7</b>	<b>Abstract Window Toolkit</b> Components and Graphics Containers, Frames and Panels Layout Managers Border Layout Flow Layout Grid Layout Card Layout AWT all Components Event Delegation Model Event Source and Handlers Event Categories, Listeners, adapters Anonymous Classes -Applets -Applet Life Cycle -Applet Context -Inter applet communication	<b>10</b>
<b>8</b>	Java utility Packages , classes, Interfaces HashTable Vector Math Random System String StringBuffer	<b>2</b>
<b>9</b>	Streams and File IO -Files and Stream -Stream classes -Reader Writer classes -File class Tests and Utilities -Serialization and de serialization	<b>3</b>

### Books Recommended

Author	Title	Publisher & Address
Cay S. Horstmann, Gary Cornell	Core Java 1.2 Vol-1 & Vol -2 Fundamentals	The Sun Microsystems Press, New Delhi.
Jerry R. Jackson & Alan L. McClellan	Java By Example 1.2	The Sun Microsystems Press, New Delhi
Peter Van der Linden	Just Java	The Sun Microsystems Press, New Delhi
Peter Van der Linden	Not Just Java, Second Edition	The Sun Microsystems Press, New Delhi



Jaffry A. Borrer	OOPs with Java An Ultimate Tutorial	The Sun Microsystems Press, New Delhi
Decker & Hirshfield	An Intro. to Programming Using Java	The Sun Microsystems Press, New Delhi
E.Balguruswamy	Programming with Java, A Primer	The Sun Microsystems Press, New Delhi

## **DATA BASE MANAGEMENT SYSTEM [203]**

- Objectives:-**
- 1) The major objective of this subject is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers.
  - 2) To acquire knowledge and to develop skill in data base management.

1	<b>Introduction</b> 1.1 History : Advantages and limitations of DBMS; Users of DBMS, 1.2 Software Modules in DBMS; Architecture of DBMS.	2
2	<b>Modeling Techniques</b> 2.1 Different Types of Models, Introduction to ERD.	7
3	<b>Hierarchical Database</b> 3.1 Introduction.	1
4	<b>Network Database</b> 4.1 Introduction	1
5	<b>Relational Algebra</b> 5.1 Select, Project, Union, Intersection, Difference, Cartesian Product, Simple Join. Queries to be solved based on the above.	3
6	<b>Relational Database</b> 6.1 Introduction; Codd's 12 Rules; Concept of Domain, Tuple, cardinality; Comparison between HDB-NDB-RDB	4
7	<b>Normalisation</b> 7.1 Advantages & disadvantages of Normalisation; 1NF-2NF-3NF- rules with examples; Anomalies.	4
8	<b>Integrity Constraints</b> 8.1 Entity-Domain-Referential integrity rules; Assertion and Triggers concept.	4
9	<b>Recovery Mechanisms</b> 9.1 Recovery from various problems of volatile and non-volatile storage devices; Concept-properties-states of Transaction; Introduction to mechanisms such as - Log, Checkpoint and Shadow Paging.	3

10	<b>Concurrency Controls</b> 10.1 Problems of concurrent Transactions; Control Mechanisms such as - Locks, Time-Stamps, Optimistic Scheduling and MVT.	3
11	<b>Distributed Databases</b> 11.1 Concepts, Data Distributions Techniques.	2
12	<b>Data Warehousing and Data Mining</b> 12.1 Concept, Architecture, Various tools in Data Warehousing, Tools in Data Mining, Difference between Data mining and normal query.	3

### SQL commands.

List of SQL commands to be covered (03)

Create/drop a Database  
Create /Modify/Alter/Drop Table  
DML Commands  
Insert, Update, Delete, Select  
Aggregate Function  
Max, Min, Avg, Count, Sum  
GROUP BY  
ORDER BY  
HAVING

### Books Recommended:

- Introduction To Database Systems. By C.J.Date
- Data Base System Concept. By Korth.
- Data Management Systems By Alexis Leon, Mathew Leon
- Principals of Database Management By James Martin.
- Computer Database Organization By James Martin.
  
- Relational database design for Micro Computers applications Prentice Hall (Jackson)
- Introduction to Data Management Systems By Atul Kahate
- Fundamentals of Database Systems By Elmasri, Navathe

### PRACTICALS [204]

- The practicals should cover programming on the computer related courses 201,202 . At least 20 programs assignment should be done by each student. Online tests, Group discussions should be conducted regularly.
- 50 marks will be given on the basis of their online test performance
- 25 marks for the group discussion /presentation and Lab practical book
- 25 marks for attendance for lab sessions

## Semester-III

### SOFTWARE ENGINEERING AND BUSINESS PROCESS – [301]

- Methodology must be case study oriented through out the syllabus.
- Faculty must design different cases and ask students to make presentations may be in groups and do proper assessment.

Sr. No	Chapter Details	HRS.
1	<b>System Concept</b> Definitions, Integrated Systems, Sub-systems, Modules, Characteristics / Objectives / types of Systems	2
2	<b>Various Phases of Software Development Life Cycle (SDLC)</b>	2
3	<b>Role of Software Engineer / Analysts / Users in the various phases of Systems Development Life Cycle.</b>	2
4	<b>Different Approaches to Software Development</b> Waterfall Model ,Spiral Model, Prototyping, RAD, Object Oriented, 4GL	4
5	<b>Structured Systems Analysis Tools and Techniques</b>  Fact Finding tools and techniques Functional Decomposition Diagram (FDD)	2
6	<b>Application System Modeling</b>  Data Modeling through ER Model Process modeling through Data Flow Diagrams (Logical / Physical) Concepts of Object Oriented Modeling through State Transition Diagrams	8
7	<b>Database Design Methods</b> Mapping ER Diagram to arrive at the Relational Database Data Normalization techniques Controlled De-normalization	6
8	<b>Logic representation techniques</b> Decision Trees Decision Tables Structured English	2
9	<b>UML tools and techniques for web-based/object oriented Applications</b> Class hierarchy Diagram, Use-Case Diagram, Sequence Diagram	3
10	<b>User Interfaces Design Menu, Forms, Reports, Messages, Screens</b>	4

11	<b>Data Codification Schemes, Designing Code-less systems</b>	1
12	<b>Standards of Source Code Development, Structured Programming.</b>	2
13	<b>Introduction to Computer Aided Software Engineering (CASE) tools, Concept of Reverse Engineering.</b>	2

**Books Recommended:**

- **Analysis and Design of Information Systems 2e** by Senn
- **Software Engineering Practitioner's Approach** by Roger Pressman
- **Introduction to System Analysis & Design** by Hawryskiewicz.
- **Systems Analysis and Design** by Elias Awad
- **Introducing Systems Analysis and Design** by Lee
- **Systems Analysis & Design** by Perry Edwards (McGraw Hill)
- **Systems Analysis, Design & Introduction to Software Engineering(SADSE)** by Parthasarthy S, Khalkar B W

## Oracle [ 302 ]

### Objective :

1. The concepts related to database, database techniques, SQLs and database operations are introduced in this subject.
2. This create strong foundation for application data design.

Sr. No	Chapter Details	Hours
1	<b>Introduction to oracle Architecture</b>	2
2	<b>Overview with tool of Oracle Sql *plus, PL/SQL</b>	1
3	<b>Introduction to SQL</b> <ul style="list-style-type: none"><li>• Data types,</li><li>• DDL create ,alter,drop</li><li>• DML insert, update, delete, select with all clauses</li><li>• Sub queries</li><li>• DCL statements</li></ul>	10
4	<b>Operators (arithmetic,comparison,logical) Predicates such as in, between, like, any, all, exists, null</b>	3
5	<b>Query Expression operators</b> <ul style="list-style-type: none"><li>• Union</li><li>• Intersect</li><li>• Minus</li></ul>	1
6	<b>SQL Functions</b> <ul style="list-style-type: none"><li>• Date functions</li><li>• Numeric functions</li><li>• String functions</li><li>• Conversion functions</li><li>• Group functions</li><li>• Nested functions</li></ul>	3
7	<b>Joins</b> <ul style="list-style-type: none"><li>• Self</li><li>• Equi</li><li>• Non equi</li><li>• Outer</li><li>• Cartesian product</li></ul>	2

8	<b>Views and Synonyms</b>	1
9	<b>PL/SQL</b> <ul style="list-style-type: none"> <li>• Introduction to PL/SQL</li> <li>• Advantages of PL/SQL</li> <li>• PL/SQL Character Set</li> <li>• Data types Character, Raw, rowid, boolean, binary_integer, number, Variable, constant</li> </ul>	2
10	<b>PL/SQL blocks</b>  Attribute - %type, %rowtype operators function comparison, numeric, character, date control structure sequential - goto	2
11	<b>Cursor</b> Explicit & implicit Cursor Cursor for loop Parametric cursor Declaring cursor variables Constrained and unconstrained cursor variables Opening a cursor variable from a query Closing cursor variables Restrictions using cursor variables	2
12	<b>Exception handling</b>  concept of exception pre defined exceptions no_data_found, cursor_already_open, dup_val_on_index, storage_error, program_error, zero_divide, invalid_cursor, login_denied, invalid_number, too_many_rows, dbms_output, user_defined exceptions	2
13	<b>Composite Datatypes</b> Record, Declaration, refer, record assignment, Table declaration, table attributes (count, delete, exists, first, last, next, prior)	2

14	<b>Procedures and Functions</b>  Definition, Implementation and Execution	2
15	<b>Packages</b>	2
16	<b>Database Triggers</b>  Types of Triggers Enabling, disabling Predicates- inserting, updating, Deleting	2

**Reference books:**

- |  |                       |
|--|-----------------------|
| 1. Database Management Systems                   | Bipin Desai           |
| 2. ORACLE 7                                      | Ivan Byrass           |
| 3. Understanding Oracle                          | Perry J. and Later J. |
| 4. SQL, PL/SQL Programming Language<br>of oracle | Ivan Byrass           |

## Web Programming [303]

### Objectives :

**To develop the skill of developing and designing a complete Web Site  
Procedures for using all HTML tags, creating client side java scripts,  
VB scripts**

Sr No	Chapter details	Hrs
1	<b>What is Web Design?</b> i. Defining Web Design ii. Web Design Themes	01
2	<b>Hypertext Markup Language</b> i. What is HyperText Markup Language? ii. Organisation of a Document in HTML <ol style="list-style-type: none"> <li>1. The structure of a document</li> <li>2. The structure of a section</li> <li>3. Substructure of other elements</li> </ol> iii. Concepts of HTML, Web Page, HTML Editor, Internet Browser, Tags. iv. HTML tags: v. <html>...</html>, <head>...</head>, <title>...</title>, <body>...</body> tags. vi. Need for <p> and   tags & difference between the two. vii. Concept of empty tags & Attributes viii. Align attribute of the <p> tag. ix. Heading Tags {<h1> to <h6>} & its attributes (Align). x. <center>...</center> tag. xi. Bgcolor & Text Attributes of <body>...</body> tag. xii. <hr> tag & its attributes (Size, Width, Color, Align). xiii. <font>...</font> tag & its attributes (Face, Color, Size) xiv. <b>...</b>, <big>...</big>, <strong>...</strong>, <i>...</i>, <dfn>...</dfn>, <cite>...</cite>, <em>...</em>, <u>...</u>, <ins>...</ins>, <s>...</s>, <strike>...</strike>, <del>...</del>, <sup>...</sup>, <sub>...</sub>, <small>...</small>, <samp>...</samp>, <tt>...</tt>, <kbd>...</kbd>, <acronym>...</acronym>, <address>...</address>, <pre>...</pre>, <blockquote>...</blockquote>, <basefont> tag (Need for BaseFont.), <ol>...</ol>, <ul>...</ul>, <li> xv. Start Attribute	15



	<ul style="list-style-type: none"> <li>xvi. Type Attribute</li> <li>xvii. &lt;dir&gt;...&lt;/dir&gt;, &lt;menu&gt;...&lt;/menu&gt;, &lt;bl&gt;...&lt;/bl&gt;, &lt;dl&gt;, &lt;dt&gt;,&lt;dd&gt;, &lt;/dl&gt;</li> <li>xviii. Imaging &amp; Linking <ul style="list-style-type: none"> <li>1. Linking &lt;a&gt;...&lt;/a&gt;</li> <li>2. HREF Attribute</li> <li>3. Imaging &lt;img&gt;</li> </ul> </li> <li>xix. Attributes of &lt;img&gt; src, alt, height, width, border, hspace, vspace, Inserting an image in the background using the background attribute</li> <li>xx. &lt;table&gt;,&lt;tr&gt;,&lt;td&gt;</li> <li>xxi. Attributes of table tags: Border, Height, Width, BGCOLOR, Align, Valign, Cellspacing and Cellpadding Attributes.</li> <li>xxii. Colspan &amp; Rowspan Attributes</li> <li>xxiii. &lt;tbody&gt; tag</li> <li>xxiv. &lt;colgroup&gt;, Span Attribute, &lt;th&gt;...&lt;/th&gt;, &lt;caption&gt;...&lt;/caption&gt;</li> </ul>	
3	<p><b>Java Script</b></p> <ul style="list-style-type: none"> <li>i. Introduction <ul style="list-style-type: none"> <li>1.Client-Side JavaScript</li> <li>2.Server-Side JavaScript</li> <li>3.JavaScript Objects</li> <li>4.JavaScript Security</li> </ul> </li> <li>ii. Operators <ul style="list-style-type: none"> <li>Assignment Operators, Comparison Operators, Arithmetic Operators , % (Modulus), + (Increment), --(Decrement) -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator) , (,) Comma operator ,delete, new, this ,void</li> </ul> </li> <li>iii. Statements <ul style="list-style-type: none"> <li>break ,comment, continue, delete, do...while</li> <li>export, for, for...in, function,</li> <li>if...else, import, labeled, return, switch, var, while,with</li> </ul> </li> <li>iv. Core JavaScript (Properties and Methods of Each) <ul style="list-style-type: none"> <li>Array, Boolean, Date, Function, Math, Number,Object</li> <li>String, RegExp</li> </ul> </li> <li>v. Document and its associated objects <ul style="list-style-type: none"> <li>document, Link, Area, Anchor, Image, Applet,Layer</li> </ul> </li> <li>vi. Form and its objects <ul style="list-style-type: none"> <li>Form, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option</li> </ul> </li> <li>vii. Events and Event Handlers <ul style="list-style-type: none"> <li>1. General Information about Events</li> <li>2. Defining Event Handlers</li> </ul> </li> </ul>	12

	<p>onAbort, onBlur, onChange, onClick, onDbClick  onDragDrop , onError, onFocus ,onKeyDown  onKeyPress , onKeyUp ,onLoad ,onMouseDown  onMouseMove, onMouseOut, onMouseOver, onMouseUp  onMove ,onReset ,onResize, onSelect, onSubmit, onUnload</p>	
4	<p><b>VB Script</b></p> <ol style="list-style-type: none"> <li>i. Variables</li> <li>ii. Data types</li> <li>iii. Operators</li> <li>iv. Converting Variables</li> <li>v. Variable Scope</li> <li>vi. Constants  VBScript Constants: VbEmpty, VbNull, VbInteger, VbLong, VbSingle, VbDouble, VbCurrency, VbDate, VbString, VbObject, VbError, VbBoolean, VbVariant, VbDataObject, VbByte, VbArray</li> <li>vii. Functions  Conversion Functions: Abs, Asc, Chr, CBool, CByte, CCur, CDate, CDbI, CInt, CLng, CSng, CStr, DateSerial, DateValue, TimeSerial, Hex, Oct, Fix, Int, Sgn  String Manipulation: Changing the Case of String (LCase, UCase), Returning the length of a String (Len), Returning the Beginning and End of a String (Left, Right), Extracting Characters From the Middle of a String (Mid), Finding a Particular Word (InStr), Trimming Text (LTrim, RTrim)</li> <li>viii. Arrays <ol style="list-style-type: none"> <li>1. Single Dimensional</li> <li>2. Dynamic</li> <li>3. Multi Dimensional (Two Dimensional)</li> </ol> </li> <li>ix. Control Structures <ol style="list-style-type: none"> <li>1. Branching: If...Then, If ...Then ElseIf, Select Case ... End, Select</li> <li>2. Looping: For... Next, Do While... Loop, Do ... Loop While, While ... Wend, Do Until ... Loop, Do ... Loop Until</li> <li>3. Jumping: Procedures, User Defined Functions</li> </ol> </li> </ol>	12
<b>Total</b>		<b>40</b>

**List of Practicals :**

1. Creating a Web Page using Basic tags
2. Creating a Web Page by changing formatting effects

3. Creating a Web Page to demonstrate List Tags
4. Creating a Web Page to demonstrate use of Images
5. Creating a Web Page to demonstrate Linking
6. Creating a Web Page to demonstrate use of Tables
7. Demonstrating Difference Between Client-Side and Server-Side Scripting
8. Demonstrating use of Operators (JavaScript)
9. Demonstrating use of Conditional Structures (JavaScript)
10. Demonstrating use of Loops (JavaScript)
11. Demonstrating use of Jumping Statements (JavaScript)
12. Demonstrating Methods and Properties of JavaScript Objects
13. Demonstrating Document Object (JavaScript)
14. Demonstrating use of Forms (JavaScript)
15. Demonstrating use of Events (JavaScript)
16. Demonstrating Variable Declaration in VBScript and Scope of Variables
17. Demonstrating Conversion Functions (VBScript)
18. Demonstrating String Manipulation Functions (VBScript)
19. Demonstrating Arrays (VBScript)
20. Demonstrating use of Conditional Structures (VBScript)
21. Demonstrating use of Loops (VBScript)
22. Demonstrating use of Jumping Statements (VBScript)
23. Demonstrating use of Procedures in VBScript

**Learning Resources :**

**1. Books :**

Sr. No.	Author	Title	Publisher
1	Thomas Powell	The Complete Reference	Tata McGraw Hill
2	Rich Darnell	HTML 4 Unleashed	SAMS Techmedia
3		Mastering JavaScript	BPB
4	Paul Wilton	Beginning JavaScript	WROX
5	Allen Wyke Richard Wagner	JavaScript Unleashed	SAMS Techmedia

6	Danny Goodman Brendan Eich	JavaScript Bible	IDG Books
7	Thomas.Powell	Complete reference HTML	Tata McGraw Hill
8	Susanne Clark, Antonio De Donatis and others	VB Script: Programmers Reference	WROX

## 2. List of Websites :

Sr. No.	Website Address
1	<a href="http://en.wikipedia.org/wiki/Web_design">http://en.wikipedia.org/wiki/Web_design</a>
2	<a href="http://www.w3schools.com/html/default.asp">http://www.w3schools.com/html/default.asp</a>
3	<a href="http://en.wikipedia.org/wiki/HTML">http://en.wikipedia.org/wiki/HTML</a>
4	<a href="http://www.w3schools.com/vbscript/default.asp">http://www.w3schools.com/vbscript/default.asp</a>
5	<a href="http://en.wikipedia.org/wiki/VBScript">http://en.wikipedia.org/wiki/VBScript</a>
6	<a href="http://www.w3schools.com/js/default.asp">http://www.w3schools.com/js/default.asp</a>
7	<a href="http://en.wikipedia.org/wiki/JavaScript">http://en.wikipedia.org/wiki/JavaScript</a>

## PRACTICALS [304]

- The practicals should cover programming on the computer related courses 302,303. At least 20 programs assignment should be done by each student. Online tests, Group discussions should be conducted regularly.
- 50 marks will be given on the basis of their online test performance
- 25 marks for the group discussion /presentation and Lab practical book
- 25 marks for attendance for lab sessions

## Semester – IV

### DATA STRUCTURES AND ALGORITHMS [401]

All coding is to be done in ANSI 'C'. Emphasis should be laid on the algorithmic features of various data structures.

Sr.no	Chapter Details	Hrs
1	<b>Data Structure Concepts :</b> Definition of Data Structure, precondition, Examples of data structures. Kinds of data structures, logical Implementation and	1

	Application levels of data structures. Node and Representative node of data structure, Empty data structure. Mathematical Structure, hardware Structure and Storage structure. Abstract Data Type (ADT) vis-à-vis data structure.	
2	<p><b>Algorithm Concepts :</b></p> <p>Algorithmics, Concept of a well posed problem, Definition of Algorithm. Recursive and iterative algorithms, Objectives of algorithmics. Quality of an algorithm, Space complexity and Time complexity of algorithm, Frequency Analysis and Problem complexity.</p>	1
3	<p><b>Arrays:</b></p> <p>Characteristics of an array. Definition of an Array, Positional value of a member, Base address of array, Indexing of an array, Index variable, Index type. Implementation of 1-D arrays, Row and Column Major implementations of 2-D, 3-D and n-D arrays. Simple examples illustrating address computations. Feature restricting the number of array implementations to two.</p>	3
4	<p><b>Stacks:</b></p> <p>Stack as a data structure, Relationship component (LIFO) in stacks. Representative node for stack, uses of stack. Static and Dynamic stack. PUSH and POP operations for stack. ANSI 'C' implementations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and reverse Polish notations. ANSI 'C' implantations of PUSH and POP operations for stacks implemented as array and linked list. Algorithm for comparing static and dynamic stacks. Polish and Reverse Polish Notations. ANSI "C" implantation of stack based algorithms for (a) Validating an expression for any mismatch of brackets, braces and parenthesis, (b) Converting an infix form to postfix form, (c) Conversion of an infix form to its prefix form, (d) Evaluation of a postfix form and (e) Evaluation of a prefix form. Simulation of recursion using stacks, stacks and nested calls.</p>	6
5	<p><b>Queues :</b></p> <p>Queue as data structure, Relationship component (FIFO) Queue. Representative nodes (Front and Rear) for queue. Classification of queue as Linear Queue, (b) Circular Queue (c) Priority Queue. ANSI 'C' Implementations of algorithms for (a) Adding a node in queue, (b) Deleting a Node form queue Finding size of queue and (d) printing a queue, for linear And circular queues expressed as</p>	5

	array and list. Dangling Pointer and Dynamic Queue. List implementation of PRIORITY QUEUE, Priority queue as a sorted list. ANSI 'C' algorithm for converting a dynamic stack into a dynamic queue and vice-versa, Concept of Double Ended Queue - DEQUE, Input Restricted DEQUE (IRD), Output Restricted DEQUE (ORD). Comparison of add node and delete node operations on different linear non recursive data structures viz. Stack, Queue, DEQUE, IRD and ORD, use of queue in multiuser OS like UNIX	
6	<p><b>Linked Lists:</b></p> <p>Concept of a Linked List as a run time equivalent of array. List versus array. Classification of a node as Atomic and List node. Internal pointer and External Pointer. Head and Tail of a list. NULL list, Length of a list. Classification of lists based on the number of internal pointers in a list node - Single and Double lists. Classification of lists based on the kind of collection - Linear list and Circular list. Linear Single List (LSL), Circular Single List (CSL), Linear Double List (LDL) and Circular Double List (CDL). ANSI 'C' algorithms for (a) Adding a node in a list, (b) Deleting a node from a list, (c) Finding length of a list and (d) Printing of a list for LSL, CSL, LDL and CDL. ANSI 'C' algorithms for (a) Sorting a LSL, (b) Creating a sorted LSL and (c) Merging of two sorted LSL. Use of LSL as a SET. Abstract representation of a list using bracket notation. Simple Linked List. Generalised Linked List with simple examples. Simple and Generalised sublists. Shared List, Shared list vis-à-vis sublist. Recursive list, Recursive list as circular and non-circular list, Recursive list as a shared list. Concept of Multilist List, Uses of Multilist Lists. ANSI 'C' algorithms for (a) Converting LSL to CSL and vice-versa and (b) LDL to CDL and vice-versa.</p>	6
7	<p><b>Trees :</b></p> <p>Concept of a Tree and Subtree. Tree as a recursive data structure. Representative node of tree (Root). Concept of a n-ary tree and Binary tree. Definitions of n-ary and 2-ary trees. 2-ary tree as Binary Tree, NULL tree. Definitions of Root, Father Node, Subtree, Left Subtree, Right Subtree, Son Node, Youngest Son Node, Brother Nodes, Ancestor Node, Descendent Node, Left Descendent Node, External Node, Weight of a tree, Level of a node, Height/Depth of a Tree. AVL Trees. Balance of a node, Weight Balanced Trees. Strictly Binary Tree, Complete Binary Tree of depth "d". Features of a complete binary tree. Almost complete binary tree of depth "d". Derivation of expression relating number of nodes of a complete binary tree with the depth of complete binary tree. Concept of an Ordered Tree. Binary</p>	6

	<p>Search Tree (BST), ANSI 'C' implementations of algorithms for (a) Adding a node in BST, (b) Deleting a node from BST, (c) Finding total number of nodes in a BST, (d) Finding total number of leaf nodes in a BST, (e) finding total number of nonleaf nodes in a BST. Concept of Tree Traversal - Inorder, Preorder and Postorder traversals of BST. ANSI 'C' implementations of algorithms for inorder, preorder and postorder tree traversals. "C" Algorithm for printing tree nodes in descending order. ANSI 'C' algorithms for (a) Creating a copy of any given BST and (b) Creating mirror image of any given BST. Representation of a simple BST as an array. Binary tree node and double list node. 'C' algorithms for (a) Level order traversal of a BST using linear queue and (b) Nonrecursive inorder traversal of any BST using stack. Concept of a Thread, Threaded binary trees, Left Threaded and Right Threaded binary search trees. Creation and inorder traversal algorithms for right threaded binary trees. Applications of trees in spellcheck software and publishing industry. Technique for converting a n-ary tree into a 2-ary tree. Huffman Algorithm, Symbol and Frequency Count of symbol. Huffman Tree, Features of a Huffman tree.</p>	
8	<p><b>Sorting Algorithms :</b> ANSI 'C' implementations for Bubble Sort, Insertion Sort for both ascending and descending order sorting.</p>	2
9	<p><b>Search Algorithms :</b> ANSI 'C' implementations of algorithms for Linear Search and Binary Search.</p>	1
10	<p><b>Symbol Tables :</b> Definition of a Symbol Table, Applications of Symbol Tables, Objectives of maintaining a symbol table. Static symbol table, Dynamic symbol table. Criterion for the selection of a storage pattern for symbol tables, AVL trees as builtin symbol tables, Inherent advantages and disadvantages of builtin symbol tables. User defined symbol Table, Concept of 1-D array as a user defined symbol table. Key of a symbol, Bucket, Bucket size, Key to address function -</p>	2
11	<p><b>Graphs :</b> Concepts of Point/vertex and Edge/arc, Adjacent vertices. Sets of vertices and edges. Definition of a graph of "n" vertices, Directed and Undirected edges and their representations. Directed and Undirected graphs and their representations, DIGRAPH and directed graph. Definitions of Incidence of a graph, Adjacent vertices, Multigraph, Adjacent to, Adjacent from, Degree of a vertex, Indegree of a vertex in directed graph, Outdegree of a vertex, Total degree of a vertex in DIGRAPH, Maximum number of edges for undirected graph of "n" vertices, Complete Graph, Maximum number of edges in a DIGRAPH of "n" vertices,</p>	7

	<p>Complete DIGRAPH, Subgraph, path, and Adjacent vertices, Connected vertices, Connected graph, Connected vis-à-vis complete graph, Strongly Connected Graph, Strongly connected graph vis-à-vis complete DIGRAPH, Simple path, cycle, Cyclic graph, Acyclic graph, Directed Acyclic Graph - DAG. Description of tree as a graph. Adjacency matrix and adjacency list representations for directed and undirected graphs. Conclusions of graph features from its matrix and list forms. Reverse adjacency lists for DIGRAPH. Adjacency Multilist List representations of undirected and directed graphs. Concept of a Graph Search. Breadth First Search (BFS) and Depth First Search (DFS) for a graph. ANSI 'C' implementations of Breadth First Search and Depth First Search algorithms. Relationships between tree traversal algorithms and tree search algorithms. Concepts of a Weighted Edge and Weighted Graph. Representations of undirected and directed weighted graphs. Cost Matrix for weighted graph. Weighted Adjacency matrix for weighted graph. Concept of a network, fields of applications of GRAPH.</p>	
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**Books recommended :**

*Data Structures Using "C"* by Tanenbaum.  
*Data Structures and Program Design in "C"* by Robert L. Kruse.  
*Fundamentals of Data Structures* by Horowitz and Sahani.  
*Data Structures : An Advanced Approach Using 'C'* by Esakov and Weises.  
*Data Structures and 'C' Programming* by Cristopher J. Vanwyk.

**Principles and Practices of Management and Organisational Behavior**  
**[402]**

**The perspective**

The purpose in designing and revising this courseware is to help the MCM students to get acquainted with the basic concepts of Management, Organisation, Organisational Behaviour and MIS, mainly from the managerial perspective.

Chapter	Name of the Chapter	Hours
1	<p><b>Section – I</b>  <b>Essence of Management</b></p> <ol style="list-style-type: none"> <li>1. The need, scope</li> <li>2. Meaning and definition</li> <li>3. The process of management</li> </ol>	5



	<ul style="list-style-type: none"> <li>4. Managerial levels/Hierarchy</li> <li>5. Managerial functions <ul style="list-style-type: none"> <li>▪ Planning</li> <li>▪ Organising</li> <li>▪ Staffing</li> <li>▪ Directing</li> <li>▪ Controlling</li> </ul> </li> <li>6. Managerial skills <ul style="list-style-type: none"> <li>▪ Technical</li> <li>▪ Conceptual</li> <li>▪ Human Resource</li> </ul> </li> <li>7. Types of managers <ul style="list-style-type: none"> <li>▪ Functional</li> <li>▪ Specialist</li> <li>▪ Generalist</li> </ul> </li> <li>8. Line and staff managers</li> </ul>	
2	<p><b>Evolution of Management Thought</b></p> <ul style="list-style-type: none"> <li>1. Historical perspective</li> <li>2. Classical theories <ul style="list-style-type: none"> <li>a. Taylor</li> <li>b. Fayol</li> </ul> </li> <li>3. Behavioral <ul style="list-style-type: none"> <li>a. H.R. approach</li> <li>b. Behavioral Science approach</li> </ul> </li> <li>4. Management Science approach</li> <li>5. Systems approach – with reference to management, organisation and MIS</li> </ul> <p>Contingency approach</p>	5
3	<p><b>Managerial Decision making</b></p> <ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Decision making environment <ul style="list-style-type: none"> <li>a. Open system</li> <li>b. Closed system</li> <li>c. Decision making under certainty</li> <li>d. Decision making under uncertainty</li> <li>e. Decision making under risk</li> </ul> </li> <li>3. Decision types / models <ul style="list-style-type: none"> <li>a. Structured decisions</li> <li>b. Unstructured decisions</li> <li>c. Programmable decisions</li> <li>d. Non programmable decisions</li> <li>e. Classical model</li> <li>f. Administrative model</li> </ul> </li> </ul>	4

	<p>4. Decision making styles</p> <ul style="list-style-type: none"> <li>a. Autocratic</li> <li>b. Participative</li> <li>c. Consultative</li> </ul> <p>5. Decision making tools</p> <p>6. Herbert Simon's model</p> <ul style="list-style-type: none"> <li>a. Principle of Rationality / Bounded Rationality</li> </ul>	
	<p><b>Section II Organisation and Organisation Behavior</b></p> <p><b>Organisation</b></p> <ul style="list-style-type: none"> <li>• Introduction - definition</li> <li>• Need for organisation</li> <li>• Process of organising</li> <li>• Organisational structure <ul style="list-style-type: none"> <li>○ Functional organisation</li> <li>○ Product organisation</li> <li>○ Territorial organisation</li> <li>○ Customer segmentation</li> <li>○ Matrix organisation</li> </ul> </li> </ul>	
4		4
	<p><b>Organisational Behavior</b></p> <p>Definition / concepts</p> <p>Need / importance / relevance</p> <p>An overview</p>	
6		2
	<p><b>Individual Behavior and Understanding Self</b></p> <ul style="list-style-type: none"> <li>• Ego state</li> <li>• Transactional Analysis</li> <li>• Johari window</li> <li>• Motivation</li> </ul>	
7		4
	<p><b>Group and Group Dynamics</b></p>	
8		4
	<p><b>Team Building</b></p>	
9		4
	<p><b>Leadership</b></p>	
10		3
	<p><b>Conflict Management</b></p>	
11		3
	<p><b>Theory X Y and Z</b></p>	
12		2

## **Books Recommended :**

1. *Principles and Practices of Management* by Koontz & O'neal
2. *Management Today Principles and Practices* by Burton & Thakur
3. *Management Principles & Functions* by Ivancevich & Gibson , Donnelly
4. *Organisational Behavior* by Stephen Robbins
5. *Organisational Behavior* by Keith Davis
6. *Organisational Behavior* by Fred Luthans
7. *Organisational Behavior* by Dr. K. Ashwatthapa

## **Project [ 403 ]**

A project report has to be submitted as per the given guidelines

### **Number of Copies:**

The student should submit two spiral -bound copies of the Project Report.

### **Acceptance/Rejection of Project Report:**

The student must submit a Synopsis of the project report to the Institute for approval. The project guide, appointed by institute holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies.

### **Format of the Project Report:**

The student must adhere strictly to the following format for the submission of the Project Report.

#### **a. Paper:**

The Report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The Report to be submitted to the University of Pune must be original and subsequent copies may be photocopied on any paper.

#### **b. Typing:**

The typing shall be of standard letter size, double spaced and on one side of the paper only, using black ribbons and black carbons.

#### **c. Margins:**

The typing must be done in the following margins :

Left ----- 35mm, Right ----- 20mm

Top ----- 35mm, Bottom ----- 20mm

#### **d. Front Cover:**

The front cover should contain the following details :

**TOP :** The title in block capitals of 6mm to 15mm letters.

**CENTRE:** Full name in block capitals of 6mm to 10mm letters.

**BOTTOM:** Name of the University, Year of submission - all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centering.

**f. Blank Sheets:**

At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

**Abstract:**

Every report should have an Abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters. The abstract should not exceed 800 words.

**Contents:**

The Contents shall follow the abstract indicating the title of the chapters, section, subsection etc.

The report should contain the following:

- Institute Certificate
- Acknowledgments
- Abstract
- List of Figures
- Tables
- Nomenclature and Abbreviations

**Contents of the Project Report:**

1. Company Profile (only for M.I.S. projects)
2. Introduction to the project
3. Scope of Work
4. Existing System and Need for System
5. Operating Environment - Hardware and Software
6. Proposed System
  - 6.1 Objectives to be fulfilled
  - 6.2 User Requirements
  - 6.3 System Features
    - Design of Input
    - Design of Output screens and reports
    - Module specifications
    - D.F.D.'s and ER's
    - Database / File layouts
    - User Interfaces
    - Coding system
    - Menu explanation
7. Drawbacks and Limitations
8. Conclusions
9. Bibliography

**List of Tables:**

The Contents shall be followed by a 'List of Tables' indicating the table number, table title and the corresponding page number(s). The table number shall be in decimal point notation indicating the chapter number and the table number in that chapter.

NOTE : Any reference within the text shall be given by quoting relevant number. eg : 'Table 5.2'

**List of Figures:**

The 'List of Figures' shall follow the 'List of Tables' indicating the figure numbers, figure titles and corresponding page number. The figure numbers shall be in decimal point notation.

**Nomenclature and Abbreviations:**

The 'Nomenclature and Abbreviations' shall follow the 'List of Figures' and contain the list of symbols and abbreviations and their long names used. The nomenclature should be given for ER's, DFD's, STRUCTURED CHARTS, RUN CHARTS and for all other symbols in the techniques used. The nomenclature for every techniques should appear on a separate sheet. As far as possible, accepted standard symbols shall be used.

**Chapter Numbering:**

The chapters shall be numbered in Arabic numerals. Section and subsections of any chapters shall be in decimal notation. All chapters shall begin on a new page. The titles for the chapters and the title shall be properly centered at the top of the page and have three spaces between them.

**Company Profile:**

This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product line of the company and the details of the department where the student was working. This should not exceed two pages or 800 words.

N.B.: Only relevant for M.I.S. Projects.

**Introduction:**

The 'Introduction' shall highlight the purpose of project work. It will also define the chapters to be followed in the Project Report.

**Existing System and the Need for the System:**

If there is some system already in use, then a brief details of it must be included, to help the examiner understand the enhancements carried out by the student in the existing system. Based on this, the student should exemplify the need for the system. If there is no existing Computerised system, the need for computerisation should be given.

N.B.: Only where relevant.

**Proposed System:**

1. **Objectives** : clearly define the objective(s) of the system in a few lines.
2. **User Requirements** : State the requirements of the user in an unambiguous manner.
3. **Requirements Determination Techniques and System Analysis**  
Methods Employed : Use the formal methods to describe the requirements of the user, like Fact finding Methods, Decision Analysis, and Data Flow Analysis etc.
- 4 **System Features**
  - 4.1 Design of Input: Inputs, Data Dictionary, Screens, Validation Methods etc.
  - 4.2 Design of Output: Outputs, Reports etc.

The choice of including topics in this chapter entirely depends on the student. The freedom given for this chapter is obvious. Students will be working on various types of projects. A typical M.I.S. development project must include DFD's & structured charts etc.

### **PRACTICALS [404]**

- The practicals should cover programming on the computer related course 401. At least 20 program assignments should be done by each student. Online tests, Group discussions should be conducted regularly.
- 50 marks will be given on the basis of their online test performance
- 25 marks for the group discussion /presentation and Lab practical book
- 25 marks for attendance for lab sessions