



Shri Vaishnav Vidyapeeth Vishwavidhyalaya, Indore

Shri Vaishnav Institute of Computer Applications

Name of the Program: **M.Sc. in Computer Science**

| COURSE CODE | CATEGORY | COURSE NAME | L | T | P | CREDITS | TEACHING & EVALUATION SCHEME | | | | |
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| | | | | | | | THEORY | | | PRACTICAL | |
| | | | | | | | END SEM University Exam | Two Term Exam | Teacher Assessment* | END SEM University Exam | Teacher Assessment* |
| MSCCS101 | DCC | Computer Organization and Architecture | 3 | 1 | 0 | 4 | 60 | 20 | 20 | 0 | 0 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components:

Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Objectives:

- To create basic understanding of Computer System Organization.
- To understand basic concept of Computer System architecture.
- To understand internal working, structuring, and implementation of a computer system.

Course Outcomes: After completion of this syllabus students will be able

- To understand computer organization structure and behavior of a computer system.
- To understand how exactly all the units in the system are arranged and interconnected.
- To understand functionalities of a Computer System Architecture in terms of instructions, addressing modes and registers.
- To understand internal working, structuring, and implementation of a computer system.

UNIT - I

Digital Computer and it types, Configuration (functional units) of Computer System, basic Operational concepts, Capabilities, Limitations and applications of computers. Definitions of

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Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals. Introduction of Number Systems like Binary, Octal and Hexadecimal number systems, Character Codes (BCD, ASCII, EBCDIC).

UNIT – II

Instruction formats, Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Addressing modes, data transfer & Manipulation, I/O Organization, Bus Architecture. Digital logic circuits: digital computer Logic gates, Boolean Algebra and its examples, K-map simplification.

UNIT – III

Combinational circuit: Half Adder, Full Adder, concept of Flip-Flop. Digital components: integrated circuits, Decoders, Encoders, Multiplexer, De-multiplexers, Registers, Counters (synchronous & asynchronous), ALU, Micro Operation.

UNIT-IV

Memory Organization: introduction to Memory units, memory Hierarchy design and its characteristics, types of main memory (RAM/ROM chips), types of RAM and ROM, Auxiliary memory (Hard Disk Drive), Associative memory, Cache memory, Virtual Memory. Introduction

| COURSE | CATEGORY | COURSE NAME | L | T | P | ☞ | TEACHING & EVALUATION |
|--------|----------|-------------|---|---|---|---|-----------------------|
|--------|----------|-------------|---|---|---|---|-----------------------|

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|----------|-----|---|---|---|---|---|-------------------------------|------------------|------------------------|-------------------------------|------------------------|
| | | | | | | | THEORY | | | PRACTICAL | |
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to System Software: Assemblers, Compiler, Interpreters, Loading, linking and relocation; Functions of editors and debuggers.

UNIT-V

Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input- Output Processor and Serial Communication. I/O Controllers, Asynchronous data transfer. Concept of 8-bit micro Processor (8085) and 16-bit Micro Processor (8086)

Text Books:

1. David Patterson and John Hennessy, Computer Organization and Design: The Hardware/Software Interface, RISC-V Edition, Morgan Kaufmann / Elsevier, 13th April 2017.
2. Stallings, Computer Organization & Architecture : Designing for performance, Tenth Edition, Pearson Education, 2016.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

Reference Books:

1. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
2. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

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3. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

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|-------------|----------|--------------------------|---|---|---|---------|------------------------------|---------------|---------------------|-------------------------|---------------------|
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| MCA103 | SEC | Internet Web Programming | 3 | 0 | 4 | 5 | 60 | 20 | 20 | 30 | 20 |

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Course Objectives:

- Provide an introduction to the fundamental concepts of HTML, CSS, XML, Javascript
- Learn CSS Grid Layout
- Develop basic programming skills using Javascript
- Develop skills in analyzing the usability of a website.
- Understand the principles of creating an effective Web Page.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes:

- Define the principle of Web page design.
- Define the basics of Javascript.
- Visualize the basic concept of HTML.
- Recognize the elements of HTML.
- Introduce basics concept of CSS.
- Develop the concept of XML, XSLT, DTD and XPath.

UNIT - I

Java Methodology: Classes, Objects, Method, Inheritance, Packages, Abstract Classes, Interfaces, Exception Handling, A brief introduction to Applets.

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|-------------|----------|--------------------------|---|---|---|---------|------------------------------|---------------|---------------------|-------------------------|---------------------|
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UNIT – II

HTML: Introduction to HTML, HTML Documents structure tags, Text Formatting Tags, Inserting Special Characters, Anchor Tags, List Tags, Tables, Frames and Floating Frames, Developing Forms, Adding Images and Sound.

UNIT – III

CSS: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables.

UNIT-IV

XML: Creating XML documents, overview of working with elements and attributes

UNIT-V

Javascript: Introduction to Javascript, Identifier and Operator, Control Structure, Functions DOM, Numbers and String Functions, Arrays and Event handling in Javascript, Bootstrapping.

List of Practical:

1. Develop a webpage using Form tag.
2. Develop a webpage using different HTML tags.
3. Develop a webpage using Table tag.
4. Develop a webpage using Frame tag.
5. Develop a static website using HTML tags.
6. Creating XML documents.
7. Creating DTD to validate XML documents.
8. Creating XSLT Stylesheet for formatting data.
9. Develop a Javascript Form.
10. Creating a Javascript POPUP Message.

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|--------|----------|-------------|---|---|---|---------|------------------------------|
|--------|----------|-------------|---|---|---|---------|------------------------------|

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- 11.Change Link colors using CSS
- 12.Create a TextBox using CSS
13. Center-Align elements using CSS
- 14 .Adjust padding using CSS
- 15.Make a Link Button using CSS

Text Books:

1. Jennifer Robbins ,”Learning Web Design:A beginner’s guide to HTML, CSS, Javascript and Web Graphics”, 5th Edition,Oreilly,2018
2. Doug Tidwell, ”XSLT: Mastering XML Transformations”,2nd Edition, Oreilly, June 2009
3. Jon Duckett,”Javascript and JQuery:Interactive Front-End Web Development”,1stEdition,Wiley,July 2014

Reference Books:

1. Craig Granell ,”The Essential Guide to CSS and HTML Web Design”, 3thEdition,Apress,March 2008
2. Jon Duckett, ”HTML and CSS:Design and Build Websites”, 1st Edition, Wiley, November 2011
3. Michael Kay,” XSLT Programmer’s Reference”,Wrox Press Ltd, 1 April 2000.

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| MCA203 | DCC | Database Management Systems | 3 | 0 | 2 | 4 | 60 | 20 | 20 | 30 | 20 |

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Course Objectives:

- To provide students with basic concepts in information system and the benefits of these systems
- To provide the knowledge of systems definition, systems requirements and information needed by the decision maker
- To understand the role, requirement and operations that an analyst needed to analyze, design, and implement the systems
- To identify several methods to enhance and develop information systems and to manage the information system resources
- To explain several ethical issues in information system
- To provide the knowledge of business data modeling for the designing of efficient information systems
- To explain the various issues related with Data Security.

Course Outcomes: After completing this course the student will be able to:

- To differentiate between data, information, and knowledge
- Create, maintain and manipulate a relational database using SQL
- Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing an information system
- Describe the characteristics of database transactions
- Understand the transaction processing system and functional area information system

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- To design the efficient database system using normalization
- Define the information systems and differentiate information systems Identify the threats to information security and to protect information recourses
- Analyze the basic concepts and architecture associated with DBMS
- To analyze any environment to determine their tables to construct database
- Information systems that support organization, management, Decision making
- To plan, acquire, and maintain information systems.

UNIT-I

Introduction: Introduction to Databases and Transactions, Purpose of Database System- Database System, Database system Vs file system, Database System concepts and architecture, Advantage of DBMS approach, various view of data, data independence, schema and subschema and instances, primary Database languages, Database administrator and users, data dictionary.

UNIT-II

Concepts of data models, **ER model:** basic concepts, notation for ER diagram, design issues, mapping constraint, Concepts of keys: super, candidate, primary, alternate, foreign, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables, reduction of ER diagrams to tables, extended ER model, relationships of higher degree.

Unit III

Relational data Model and Language:

Relational Algebra: concepts, domains, relations, kind of relations, relational database, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, The structure, relational algebra with extended operations, modifications of Database.

Relational Calculus: idea of relational calculus, tuple and domain calculus, Domain relational Calculus, calculus Vs algebra, computational capabilities.

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Unit IV

Relational Database Design: basic concepts and definitions, trivial and non-trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, Canonical Cover.

Normalization: Introduction, non-loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multi valued dependencies and fourth normal form, Join dependency and fifth normal form. Codd's rules, Relational Schemas, Introduction to UML, Alternative approaches to database design.

UNIT-V

SQL: Introduction, basic structure of SQL, Characteristics and Advantage of SQL set operations, aggregate functions, null values, SQL data types and literals. SQL operators, Types of SQL commands. Nested sub queries, derived relations, modification of Database, Aggregate functions. Insert, update and delete operations. Triggers in SQL.

Views: Introduction to views, data independence, security, updates on views, comparison between tables and views

Distributed Database: basic idea, distributed data storage.

Concepts of **Transaction, concurrency and Recovery:** basic concepts, ACID properties, Transaction states, Implementation of atomicity and durability, concurrent executions.

List of Experiments:

- To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
 - Create a database named 'Employee'.
 -

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| | | | | | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* |
| MCA203 | DCC | Database Management Systems | 3 | 0 | 2 | 4 | 60 | 20 | 20 | 30 | 20 |

- Use the database 'Employee' and create a table 'Emp' with attributes 'ename', 'ecity', 'salary', 'enumber', 'eaddress', 'deptname'.
- Create another table 'Company' with attributes 'cname', 'ccity', 'empnumber' in the database 'Employee'.

2 To study the viewing commands (select , update) and execute the following queries using these commands:

- Find the names of all employees who live in Delhi.
- Increase the salary of all employees by Rs. 5,000.
- Find the company names where the number of employees is greater than 10,000.
- Change the Company City to Gurgaon where the Company name is 'TCS'.

3. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:

- Add an attribute named 'Designation' to the table 'Emp'.
- Modify the table 'Emp', Change the datatype of 'salary' attribute to float.
- Drop the attribute 'deptname' from the table 'emp'.
- Delete the entries from the table 'Company' where the number of employees are less than 500.

4. To use (and, or, in , not in, between , not between , like , not like) in compound conditions and execute the following queries using them:

- Find the names of all employees who live in 'Gurgaon' and whose salary is between Rs. 20,000 and Rs. 30,000.
- Find the names of all employees whose names begin with either letter 'A' or 'B'.
- Find the company names where the company city is 'Delhi' and the number of employees is not between 5000 and 10,000.
- Find the names of all companies that do not end with letter 'A'.

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| MCA203 | DCC | Database Management Systems | 3 | 0 | 2 | 4 | 60 | 20 | 20 | 30 | 20 |

5. Using aggregate functions execute the following queries:

- Find the sum and average of salaries of all employees in computer science department.
- Find the number of all employees who live in Delhi.
- Find the maximum and the minimum salary in the HR department.

6. To execute the following queries using study the grouping commands (group by, order by)

List all employee names in descending order.

- Find number of employees in each department where number of employees is greater than 5.
- List all the department names where average salary of a department is Rs.10,000.

7. To write SQL queries

Alter table 'Emp' and make 'enumber' as the primary key.

- Alter table 'Company' and add the foreign key constraint.
- Add a check constraint in the table 'Emp' such that salary has the value between 0 and Rs.1,00,000.
- Alter table 'Company' and add unique constraint to column cname.
- Add a default constraint to column ccity of table company with the value 'Delhi'.
- Rename the name of database to 'Employee1'.
- Rename the name of table 'Emp' to 'Emp1'.
- Change the name of the attribute 'ename' to 'empname'.

8. To execute following queries using appropriate

Retrieve the complete record of an employee and its company from both the table using joins.

- List all the employees working in the company 'TCS'.

9. To study the various set operations and execute the following queries using these commands:

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|------------------------------|--|--|--|--|--|--|
|------------------------------|--|--|--|--|--|--|

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- List the number of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
- List the number of all employees who live in Delhi but whose company is not in Gurgaon.

10. To study the various scalar functions and string functions (power, square, substring, reverse, upper, lower, concatenation) and execute the following queries using these commands:

- Reverse the names of all employees.
- Change the names of company cities to uppercase.
- Concatenate name and city of the employee.

11. To study the commands for views and execute the following queries using these commands:

- Create a view having ename and ecity.
- In the above view change the ecity to 'Delhi' where ename is 'John'.
- Create a view having attributes from both the tables.
- Update the above view and increase the salary of all employees of IT department by Rs.1000.

12. To study the commands involving indexes and executes the following queries:

- Create an index with attribute ename on the table employee.
- Create a composite index with attributes cname and ccity on table, company.
- Drop all indexes created on table,company.

Text Books:

1. A Silberschatz, H.F Korth, Sudersan, "Database System Concepts", 6th Edition, MGH Publication 2013.
2. C.J. Date, "An introduction to Database Systems", 6th Edition, Pearson 2003.
3. Elmasri & Navathe, "Fundamentals of Database systems", 7th Edition, Pearson 2015.

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| MCA203 | DCC | Database Management Systems | 3 | 0 | 2 | 4 | 60 | 20 | 20 | 30 | 20 |

4. B.C. Desai, “An introduction to Database systems”, BPB.

5. Raghu Ramakrishnan, “Database Management Systems”, 3rd Edition, TMH 2014.

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Name of the Program: **M.Sc. in Computer Science**

| COURSE CODE | CATEGORY | COURSE NAME | L | T | P | CREDITS | TEACHING & EVALUATION SCHEME | | | | |
|-------------|----------|--------------------|---|---|---|---------|------------------------------|---------------|---------------------|-------------------------|---------------------|
| | | | | | | | THEORY | | | PRACTICAL | |
| | | | | | | | END SEM University Exam | Two Term Exam | Teacher Assessment* | END SEM University Exam | Teacher Assessment* |
| MSCCS105 | SEC | Programming with C | 3 | 0 | 4 | 5 | 60 | 20 | 20 | 30 | 20 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid SEM Test.

***Teacher Assessment** shall be based on following components:

Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

The languages that programmers use are constantly changing, and the popular languages of today will surely be replaced by new ones. The objective of this course is to provide students with a working knowledge of the basic principles underlying the design of all computer programming languages.

Course Outcome (COs): Students completing this course should be able to quickly learn to effectively use new computer programming languages. In particular, after taking this course students should be able to do the following:

- Design an algorithmic solution for a given problem.
- Draw flowcharts for the solution.
- To write a maintainable C program for a given algorithm.
- To Write well documented and indented program according to coding standards..
- Debug a given program.
- To Execute the C program.

UNIT 1:-Programming fundamentals: Algorithm development, techniques of problem solving, flow-chart, decision table, structured programming concepts; top-down design, development of

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efficient program; program correctness; debugging and testing of programs, algorithm for searching, sorting (exchange and insertion), merging of ordered lists.

UNIT 2:- Programming in C: Introduction to C, features of C , IDE of C Data type, constants and variable; structure of a C program,, Compilation & execution of C program., Identifiers, Operators: Arithmetic, Logical, Relational, Conditional and Bitwise operators, Precedence and associativity of operators, Types conversion in expression , Library Functions , Control structures- If Statement, If.....Else Statement, Nesting Of IfElse Statement, Else If Ladder, ? : Switch Statement, Compound Statement, Loop Controls – For, While, Do-While Loops, Break Continue, Exit, Goto Statement

UNIT 3:- Array- Representation of single and multidimensional arrays; sparse arrays - lower and upper triangular matrices and Tri-diagonal matrices Array as function arguments.

String : Declaration, Initialization, String Functions

Functions:- top-down approach of problem solving, modular programming and functions, standard library of c functions, prototype of a function:, return type, function call, block structure, passing arguments to a function: call by reference, call by value, recursive functions, arrays as function arguments

UNIT 4:- Structures and Unions structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions Pointer-The & and * Operators, Pointers expressions, Pointers V/s Arrays, Pointer to functions, Function returning pointers.

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UNIT 5:- File management-Defining, Opening a File & Closing a File, Text file, Binary file, Functions for File Handling: fopen, fclose, gets, puts, fprintf, fscanf, getw, putw, fputs, fgets, fread, fwrite, Random access to files: fseek, ftell, rewind, file name as Command Line Argument.

TEXT BOOKS:-

- Programming in c by e. balagurusamy, tmh publications
- Programming with c by gottfried, schaumsoutlie series, tmh publications
- Thinking in c by mahapatra, phi publications
- Kenneth, A. : C problem solving and programming, Prentice Hall.
- Gottfried, B. : Theory and problems of Programming in C, Schaum Series.
- Kerninghan&Ritchie : The Programming Language, PHI.

List of Experiments:

1. Define an algorithm and flowchart. Draw algorithm and flow chart for a program that converts an input Fahrenheit degree into Celsius equivalent
2. Write an algorithm and a C program to find the greatest among three numbers.
3. WAP to print an input string in lower case, upper case and mixed case using library function.
4. WAP a C program to reserve an input number.
5. Draw a flow chart to find prime number from 1 to 100.
6. Write a C program to obtain the sum of first n terms of the following series: $X - X^3/3! + X^5/5! - X^7/7! + \dots$

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| MSCCS105 | SEC | Programming with C | 3 | 0 | 4 | 5 | 60 | 20 | 20 | 30 | 20 |

- WAP to calculate factorial of a number using different loops.
- WAP to calculate factorial of a number using recursion.
- WAP in C to generate Fibonacci series.
- WAP in C to generate Pascal triangle.
- WAP in C to swap value and address of two variables.
- WAP in C to search a given element in an array using linear and binary search.
- WAP to sort an integer array in ascending and descending order according to user's choice.
- Write a menu driven program to perform matrix addition, subtraction and multiplication.
- Write a program to sum diagonal elements of two matrices.
- WAP a C program to reverse a string by recursion.
- WAP using structure in C to generate student mark-sheet for 3 students with student details name, course, and semester and with marks in 5 subjects, assume max mark in each subject as 100 and passing marks as 35.
- WAP display contents of a file on screen, also display character count.
- WAP to read data from file using fscanf().
- WAP to add two numbers using command line arguments.
- Write a program to copy contents of file c:\test.txt to c:\test1.txt

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| HUPG101 | AEC | Technical Communication and Soft Skills | 3 | 1 | 0 | 4 | 60 | 20 | 20 | 0 | 0 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will be able to:

- Enable them communicate their ideas relevantly and coherently in speaking and writing.
- Understand the nuances of technical communication.

Course Outcomes (COs): The students should be able to:

- Use language accurately, fluently and appropriately.
- write project reports, reviews and resumes
- Exhibit advanced skills of interview, debating and discussion.

UNIT I

Fundamentals of Technical Communication: Technical Communication: Features; Distinction between General and Technical Communication; Language as a tool of Communication; Dimensions of Communication: Technical writing: Paragraph writing; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication.

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UNIT II

Forms of Technical Communication: Technical Report: Technical Report v/s General Report ; Speech: Introduction & Summarization; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration. Skills and sub skills of LSRW.

UNIT III

Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Public Speaking: method; Techniques: Clarity of substance; emotion; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of Presentation, Areas for an effective presentation.

UNIT IV

Technical Communication Skills: Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective Interview Skills – formal & informal interviews, concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing, Group Discussion – dynamics of group discussion.

UNIT V

Soft Skills: An Introduction–Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development, Time Management–Concept, Essentials, Tips. Decision-Making, Conflict Management: Conflict-Definition, Nature, Types and Causes; Methods of Conflict Resolution.

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Suggested Readings

- Simon Sweeny, “English for Business Communication”, CUP, First South Asian Edition, 2010.
- Ashraf Rizvi, “Effective Technical Communication”, TataMcGraw-Hill Publishing Company Ltd. 2005.
- Sunita Mishra & C. Muralikrishna, “Communication Skills for Engineers”, Pearson Education, 2007.
- Meenakshi Raman & Sangeeta Sharma, “Technical Communication”, Oxford University Press, 2011.
- R.C. Sharma, Krishna Mohan, “Business Correspondence and Report writing”, 4th Edition, Tata Mcgraw-Hill Publishing Co. Ltd., 2010.

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