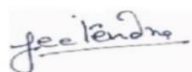


## Programme Project Report (PPR)

(Master of Science in Information Technology)

- a. Programme's mission & objectives:** The objective of this programme is to equip the learner with the latest tools and techniques of computing and informatics. The course is designed to meet the growing demand for qualified professionals in the field of Information Technology. It helps the learners to acquire the knowledge required for the positions of system analysts, systems designers, programmers and managers in any field related to Computing & Informatics. This 2 years course covers subjects like Programming Languages, Mathematics and Accounting, which provide in-depth understanding to students about concepts like IT tools and applications. MSc(IT) from distance education trains you in fields like system designing, system administration, computer networks, data mining, warehousing, enterprise resource planning, application software development, web designing and so on. The programme, therefore, aims at imparting comprehensive knowledge of the subject with equal emphasis on theory and practice. It also aims at the understanding of the fundamentals of computing among the students so that they can compete in the present-day global situation.
- b. Relevance of the program with HEIs Mission and Goals:** One of the important aims of higher education is the training for leadership in the profession and public life. Master of Science in Information Technology(MSc(IT)) is a two-year (four semesters) professional Master's Degree in computer science which is inclined more toward application development and thus has more emphasis on latest programming language and tools to develop better and faster applications. It prepares students to take up positions as system analysts, systems designers, programmers and managers in any field related to information technology. As the IT and the software industry are dynamic and fast growing, all the programmes are designed keeping in view the requirements of industry.
- c. Nature of prospective target group of learners:** The students who wish to join an MSc(IT) program is required to have a Bachelors degree in any stream from a recognized institution/university with mathematics as a subject at graduation or 10+2 level. In case the candidate do not have mathematics subject, a bridge course on mathematics is mandatory. The candidates who pose a PGDCA/ BTech from a reputed university or its equivalent course are eligible for lateral entry to third semester of MSc(IT) program.
- d. Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence:** The Open and Distance Learning (ODL) University system is more learner-oriented where of the instruction is imparted through distance mode with only a small component of face-to-face communication. The University follows the Credit System for its programmes. Each credit is worth 30 and the student has to be an active participant in the teaching-learning process. Most hours of student study time, comprising all the learning activities. Thus, a four-credit course involves 120 study hours. This helps the student to understand the academic effort one has to put into successfully complete a course. Completion of the programme requires successful



completion of both assignments and the Term-End Examination of each course along with practical examination of practical oriented courses of the programme. The specially designed printed Self Learning Material for different subject along with other support material is provided to the learners through post/ study center. The study material can also be downloaded through the Universities' e- repository. The University follows a multi-channel approach for the delivery of instruction. It comprises a suitable mix of:

- self-instructional printed material
- audio / video cassettes and CDs
- audio-video programmes transmitted through Hello Haldwani FM Radio and EduSat, and at study centre.
- face-to-face counselling at study centres by academic counselors
- reference library at study centre
- web based academic support
- assignments
- practical

The practical sessions are held in the computer centres / labs of the Study Centres. In these computer labs, the participants have the facility to use the computer and software packages relevant to the syllabus.

- e. **Instructional Design:** Open and Distance learning (ODL) is an innovative approach of providing opportunity of learning through Self Learning Material (SLM) and certain other strategies in a flexible manner at the pace of learners. In this mode, the learner is also provided academic support in the form of counseling and audio/video material in addition to SLM. The University follows the Credit System for its programmes. The MSc(IT) programme is of 71 credits and each credit is worth 30 hours of student study time, comprising all the learning activities. Thus, a four-credit course involves 120 study hours. This helps the student to understand the academic effort one has to put into successfully complete a course.
- f. **Procedure for admissions, curriculum transaction and evaluation:** Direct admission to MSc(IT) program is offered to the interested students. This programme has been designed with a semester approach in mind. The first year courses are aimed at skills development in computers using various technologies, the second year is more focused on core courses providing conceptual framework, specialization and the project work. The total numbers of courses in this MSc(IT) programme are 15 along with 4 practicals , 1 mini and 1 major project and the total number of credits is 71. Evaluation for each course covers two aspects:
- Continuous evaluation through Assignment with a weightage of 30%.
  - Term-end examination with a weightage of 70%.

To fulfill the requirements for acquiring the MSc(IT), a student may clear all the courses in a minimum of two years and a maximum of 4 years. In case the student is unable to pass all the courses of the MSc(IT) programme in 4 years, s/he can continue for another two years by seeking Re-admission to the courses which s/he is unable to successfully complete. Completion of the programme requires successful completion of both assignment component and the Term-end Examination component for each course in the programme. The term-end examination of the

practical courses consists of several sections. Each section is evaluated separately. The viva-voce for each section will also be separate. The 60% marks of the practical exam are for practical questions and remaining 40% for viva-voce. A student needs to obtain a minimum of 40% in each section of the term-end practical examination for successful completion of that particular section. In case a student does not secure the minimum passing marks in a section, s/he needs to appear for the term-end practical examination again for that section only.

- g. Requirement of the laboratory support and Library Resources:** The practical sessions are held in the computer centres / labs of the Study Centres. In these computer labs, the participants will have the facility to use the computer and software packages relevant to the syllabus. The SLM, supplementary text audio and video material of the various courses of the program is available through the e-repository of the University. The University also have a subscription of National Digital Library to provide the learners' with the ability to enhance access to information and knowledge of various courses of the programme.
- h. Cost estimate of the programme and the provisions:** The MSc(IT) Programme is a part of the modular structure of 3 years MCA programme. The MSc(IT) programme consists of first two years of MCA programme. Therefore, separate funds are not requires for the development, implementation and maintenance of the programme.
- i. Quality assurance mechanism and expected programme outcomes:** The program structure is developed under the guidance of the expert committee and Board of studies of the School based on the model curriculum of the programme recommended by AICTE. The program structure and syllabus is approved by the Academic Council of the University. The course structure and syllabus is reviewed according to the needs of the IT Industry every five years. MSc(IT) programme has been designed to prepare graduates for attaining the following program outcomes:
- an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
  - an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
  - an ability to function effectively on teams to accomplish a common goal.
  - an understanding of professional, ethical, legal, security and social issues and responsibilities.
  - an ability to communicate effectively with a range of audiences.
  - an ability to analyze the local and global impact of computing on individuals, organizations, and society.
  - an ability to use current techniques, skills, and tools necessary for computing practice.
  - An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
  - An ability to apply design and development principles in the construction of software systems of varying complexity.
  -

## APPEXDIX-I

### Program Structure of Master of Science (Information Technology) MSc(IT)-21

1. **Title of Programme:** Master of Science (Information Technology)
2. **Programme Code:** MSc(IT)-21
3. **Programme Mode:** Semester
4. **Admission Cycle:** Twice every Year in Jan. And July
5. **Eligibility:** Passed BCA/BSc(IT/CS)/ (B.Sc. with Mathematics at 10+2 Level or at Graduation Level).  
Candidate not having mathematics at 10+2 or graduation will have to pass one qualifying mathematic course during the course of the programme (Sr. Secondary Mathematics paper in SWAYAM portal by Dr. Rajendra Kumar Nayak, NIOS). The equivalent courses shall be identified from time to time and the detailsshall be provided in the University website.
6. **SLM Availability Medium :**English
7. **Duration:**  
**Min:** 2 Year  
**Max:** 4 Years
8. **Total Credit :** 72
9. **Lateral Entry (Third Semester):** PGDCA from UGC recognized University with Mathematics at 10+2 or Graduation level/ 4-year degree in Computer Science Engineering or Information Technology/ A-level from DOEACC after graduation.
10. **Objective of the Programme:** The objective of this programme is to equip the learner with the latest tools and techniques of computing and informatics. The professionals who could develop solutions making use of computer applications is the crux of this programme. It helps the learners to acquire the knowledge required for the positions of system analysts, systems designers, Programmers and managers in any field related to  
Computing & Informatics. The programme, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice
11. **Programme Structure:** The program structure of the MSc(IT) program is as follows:

Course Code	Title of the Course	Credits	Theory/Practical/Project Marks	Assignment
<b>First Semester</b>				
MCS-401	Introduction to Programming using C	4	70	30
MCS-402	Introduction to Computing	4	70	30
MCS-403	Technical English and Business Communication	4	70	30
MCS-404	Digital Electronics	4	70	30
MCS-BCP1	Practical	2	50	-
<b>Second Semester</b>				
FCS	Fundamentals of Cyber Security	4	100	-
MCS-405	Data Structures & Program Methodology	4	70	30
MCS-406	Information System for Business	4	70	30
MCS-BCP2	Practical	2	50	-

*Dr. Dm. All manifest*

*jeelendra*

*Balendu Dabanti*

*Dr*

*jeelendra*

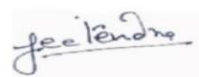
*Balendu Dabanti*

*Dr*

Course Code	Title of the Course	Credits	Theory/Practical/Project Marks	Assignment
<b>Third Semester</b>				
MCS-501	Discreet Mathematics	4	70	30
MCS-502	Object Oriented Programming through C++	4	70	30
MCS-503	Software Engineering	4	70	30
MCS-504	Operating System	4	70	30
MCS-P1	Practical	2	50	-
<b>Forth Semester</b>				
MCS-505	Database Management System	4	100	-
MCS-506	Introduction to Computer Networks	4	70	30
MCS-507	Design and Analysis of Algorithms	4	70	30
MCS-508	Programming in Java	4	70	30
MCS-P2	Practical	2	50	-
MCS-Project	Project	4	100	-

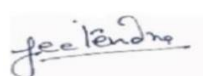














# SYLLABUS

## Introduction to Programming using C

### MCS-401

#### BLOCK I

**Unit 1: Programming Building Blocks:** Specification, Implementation, Hello, World! Example.

**Unit 2: Variables, Expressions, and Statements:** Variables, Operators, Expressions, Statements.

**Unit 3: Functions:** Passing by Value, Function Prototypes.

**Unit 4: Variables:** Up Scope, Storage Classes

#### BLOCK II

**Unit 5: Pointers:** Memory and Variables, Pointer Types, Dereferencing, Passing Pointers as Parameters.

**Unit 6: Structures:** Pointers to structs, Passing struct pointers to functions.

**Unit 7: Arrays:** Passing arrays to functions.

**Unit 8: Strings**

**Unit 9: Dynamic Memory:** malloc(), free(), realloc(), calloc().

#### BLOCK III

**Unit 10 Advance Topics:** Pointer Arithmetic, typedef, enum, More struct declarations, Command Line Arguments, Multidimensional Arrays, Casting and promotion, Incomplete types, void pointers, NULL pointers, More Static, Typical Multifile Projects, The Almighty C Preprocessor, Pointers to pointers, Pointers to Functions, Variable Argument Lists.

**Unit 11. Standard I/O Library:** fopen(), freopen(), fclose(), printf(), fprintf(), scanf(), fscanf(), gets(), fgets(), getc(), fgetc(), getchar(), puts(), fputs(), putc(), fputc(), putchar(), fseek(), rewind(), ftell(), fgetpos(), fsetpos(), ungetc(), fread(), fwrite(), feof(), ferror(), clearerr(), perror(), remove(), rename(), tmpfile(), tmpnam(), setbuf(), setvbuf(), fflush().

**Unit 12. String Manipulation:** strlen(), strcmp(), strncmp(), strcat(), strncat(), strchr(), strrchr(), strcpy(), strncpy(), strspn(), strcspn(), strstr(), strtok().

**Unit 13: Mathematical Functions:** sin(), sinf(), sinl(), cos(), cosf(), cosl(), tan(), tanf(), tanl(), asin(), asinf(), asinl(), acos(), acosf(), acosl(), atan(), atanf(), atanl(), atan2(), atan2f(), atan2l(), sqrt().

**Unit 14: Complex Numbers**

**Suggested Readings:**

1. Let us C-Yashwant Kanetkar.
2. Programming in C- Balguruswamy
3. The C programming Lang., Pearson Ed – Dennis Ritchie
4. Structured programming approach using C-Forouzah & Ceilberg Thomson learning publication.
5. Pointers in C – Yashwant Kanetkar

**Supplementary Course Material available at:** <http://www.freetchbooks.com/beejs-guide-to-c-programming-t986.html>

*Y2* *DM* *Y2* *manish* *jeetendra* *Balendra Dabanti*

*Y2* *jeetendra* *Balendra Dabanti* *Y2*

# Introduction to Computing

## MCS-402

### BLOCK I

#### Unit 1: Computing

Computing: Processes, Procedures, and Computers; Measuring Computing Power: Information, Representing Data, Growth of Computing Power; Science, Engineering, and the Liberal Arts, Summary and Roadmap.

#### Unit II: Defining Procedures

Language, Surface Forms and Meanings, Language Construction, Recursive Transition Networks, Replacement Grammars.

#### Unit III Programming

Problems with Natural Languages, Programming Languages, Scheme, Expressions: Primitives, Application Expressions; Definitions, Procedures: Making Procedures, Substitution Model of Evaluation; Decisions, Evaluation Rules.

### BLOCK II

#### Unit IV: Problems and Procedures

Solving Problems, Composing Procedures: Procedures as Inputs and Outputs; Recursive Problem Solving, Evaluating Recursive Applications, Developing Complex Programs: Printing, Tracing.

#### Unit V: Data

Data Types, Pairs: Making Pairs, Triples to Octuples; Lists, List Procedures: Procedures that Examine Lists, Generic Accumulators, Procedures that Construct Lists; Lists of Lists, Data Abstraction.

#### Unit VI: Analyzing Procedures

Machines, History of Computing Machines, Mechanizing Logic: Implementing Logic, Composing Operations, Arithmetic; Modeling Computing: Turing Machines.

### BLOCK III

#### Unit VII: Cost

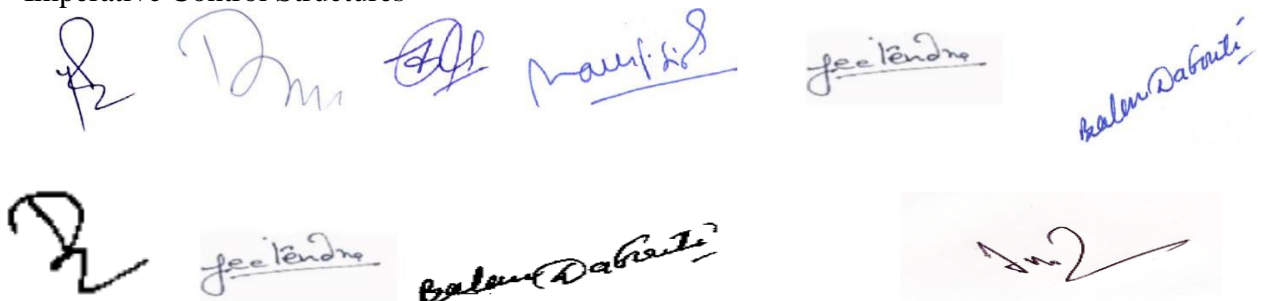
Empirical Measurements, Orders of Growth: Big O, Omega Theta; Analyzing Procedures: Input Size, Running Time, Worst Case Input; Growth Rates: No Growth: Constant Time, Linear Growth, Quadratic Growth, Exponential Growth, Faster than Exponential Growth, Non-terminating Procedures

#### Unit VIII: Sorting and Searching

Sorting: Best-First Sort, Insertion Sort, Quicker Sorting, Binary Trees, Quicksort; Searching: Unstructured Search, Binary Search, Indexed Search;

#### Unit IX: Improving Expressiveness

Mutation, Assignment, Impact of Mutation: Names, Places, Frames, and Environments, Evaluation Rules with State; Mutable Pairs and Lists, Imperative Programming: List Mutators, Imperative Control Structures



A collection of handwritten signatures and names in blue ink, arranged in two rows. The top row contains six signatures: a stylized 'R', 'Dm', 'All', 'maurice', 'jeetendra', and 'balen Dabanti'. The bottom row contains four signatures: a stylized 'R', 'jeetendra', 'balen Dabanti', and a stylized 'R'.

## BLOCK IV

### Unit X: Objects

Packaging Procedures and State: Encapsulation, Messages, Object Terminology; Inheritance: Implementing Subclasses, Overriding Methods; Object-Oriented Programming.

### Unit XI: Interpreters

Python: Python Programs, Data Types, Applications and Invocations, Control Statements; Parser, Evaluator: Primitives, If Expressions, Definitions and Names, Procedures, Application, Finishing the Interpreter; Lazy Evaluation: Lazy Interpreter, Lazy Programming.

### Unit XII: The Limits of Computing

Computability, Mechanizing Reasoning: Godel's Incompleteness Theorem; The Halting Problem, Universality, Proving Non-Computability.

Supplementary Course Material available at: <http://www.computingbook.org/FullText.pdf>

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R, Dm, All, manifest, feelendro, balen Dabanti

*Handwritten signatures and text:*  
R, feelendro, balen Dabanti, R

# Technical English and Business Communication

## MCS-403

### Block I

**Unit I:** Definition of Technical Vocabulary, Word Formation, Principles of word formation

**Unit II:** SUFFIX, NOUN to NOUN, VERBS TO NOUNS , NOUN TO VERBS, NOUN TO ADJECTIVE, ADJECTIVES TO NOUNS, VERBS TO ADJECTIVES, LESS COMMON SUFFIXES, COMPOUND ADJECTIVES

**Unit III:** ARTICLES, Conjunctions and Prepositions, Conjunctions, Prepositions , Use of prepositions

**Unit IV:** ACTIVE AND PASSIVE VOICE, Changing Active Voice into Passive Voice, Changing Passive Voice into Active

### Block II

**Unit V:** NOTE MAKING: Reading strategy, How to make notes?, Indenting, Heading, Format, Methods of note making, Topicalising, Sequencing, How do you summarize?, Reading Text, Skimming, Skim the material .

**Unit VI:** PARAGRAPH WRITING: Salient features , Unity, Coherence, Key points to remember. TRANSCODING : Role play, Conversational Techniques, Discussions, Oral Reporting, What is role play? Why use role play? How to use role playing? Ground rules for interactive exercises, Role play example, Roleplay - conversational Techniques discussions – Oral, Reporting.

**Unit VII:** Vocabulary Items, Prefix, Words with prefixes – ‘multi- ’ , Words with prefix ‘under-’, Asking and answering questions, YES / NO question Forms, Tag Questions, Information (or Question word) questions, Spelling and Punctuation, The full stop, The Questionmark, The exclamation mark, The Comma, The Apostrophe (‘), Semi – colon (;), The colon (:), Quotation Marks, The Hyphen, Capital letters, Parentheses ( ), Brackets [ ]

**Unit VIII:** Reading Comprehension, Scanning for Information, Two Levels of Reading, Steps for Scanning, Listening and Guided Note – taking, Levels of Listening, The Barriers to listening, Complex Inter personal relationship, Misread the non verbal cues, Rules of good listening, Note taking study skills, Listening for details. Paragraph writing: The structure of a Paragraph, Topic Sentence, Note making. Comparing and Contrasting using expressions of comparisons, Discussing creative ideas, Use of Modals verbs, Tips to understand the functioning of Modals

### Block III

**Unit IX:** COMPOUND NOUNS- NEGATIVE PREFIXES: COMPOUND NOUNS, PREFIXES: Negative Prefixes. Antonym: List of Antonyms. Noun and verb compounds, Noun



The image shows several handwritten signatures and names in blue ink. The names include 'R2', 'Dm', 'All', 'maurice', 'jeetendra', 'kalen Dabanti', 'jeetendra', 'kalen Dabanti', and 'R2'.

and Gerunds, Gerund and Noun, Noun to noun, Noun and adjective , Prepositions and Noun, Making sentences using phrases.

**Unit X: TENSES – SIMPLE PAST AND PRESENT PERFECT:** Present Perfect Tense , Present Perfect Tense in Affirmative sentences, Present Perfect Tense in Interrogative sentences, Negative Sentences. **SIMPLE PAST TENSE:** The Narrative Past, Reported Speech : Reporting verb in the past tense, Change of pronouns and possessive adjectives, Adverbs and adverbial phrases of time. Interrogative sentences, Exclamatory sentences, Imperative sentences, Reading and guessing meanings in context

**Unit XI: LISTENING AND NOTE TAKING:** Techniques of note taking while listening, Listening, Filtering, Paraphrasing, Note taking, Channel Conversation from text to chart, Making Recommendations: Process for making recommendation. Discussion – Role play explaining and convincing, Expanding Nominal Compounds – Words with multiple meanings, Error Correction: Common Pronoun errors, Adverbial expressions, Confusion with prepositions & infinitives. Compound Adjectives.

#### **Block IV**

**Unit XII: SIMPLE PAST AND PRESENT PERFECT TENSE**

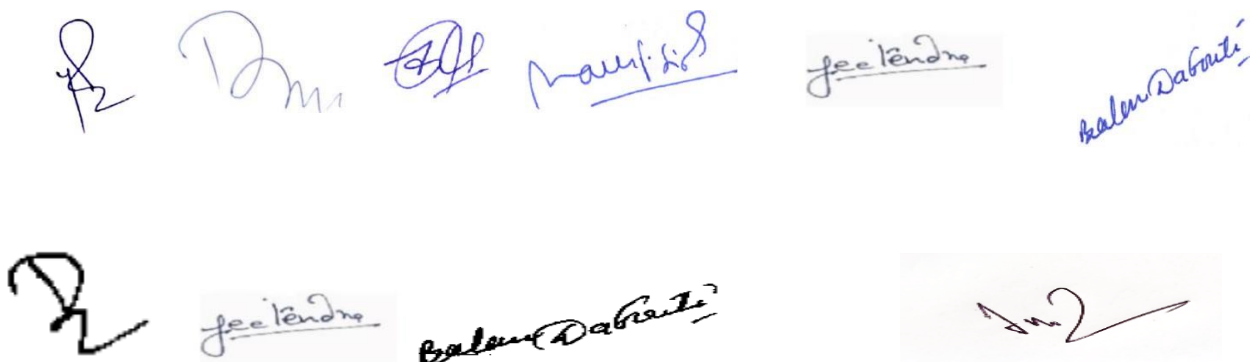
**Unit XIII:** Reading – Prediction of content, Understanding Advertisements, Drafting advertisements, Scanning the text and comprehension check. Listening for details – Listening Comprehension, Logical Connectors and Transitional Signals, Active Listening Quiz, Role play – Discussion speculating about future, Comparison, Contrast , Conjunctions and expressions to be used, Role play – Discussion speculating about future

**Unit XIV:** Formation of Nouns, Verbs and Adjective from Root Words, **USEFUL PHRASES AND EXPRESSIONS**, Gerunds: If conditional clauses – gerunds, Gerunds as passive forms , Perfect forms of gerunds, Reading for Comprehension – Intensive Reading. Accuracy in Listening – Listening to discussion on specific issues.

**Unit XV: GROUP DISCUSSION AND WRITING FORMAL LETTERS**

**Supplementary Course Material is available at:** <http://nptel.ac.in/courses/109106066/2>

and  
<http://nptel.ac.in/courses/109104030/>



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# Digital Electronics

## MCS-404

### Block I

**Unit I:** Introduction Weighted-Position Number System, Number System Conversions, Representation of Negative Numbers: One's Complement Representation, Two's Complement Representation

**Unit II:** Binary Coded Decimal Codes, Unit Distance Codes, Alphanumeric Codes, Error Detection and Correcting Codes

**Unit III:** Boolean Algebra: Boolean Algebra and Huntington Postulates, Propositions from Huntington's Postulates, Boolean operators.

**Unit IV:** Logic Functions in Algebraic Form, Truth Table Description of Logic Function, Conversion of English Sentences to Logic Function, Minterms and Maxterms, Circuit Representation of Logic Functions

### Block II

**Unit V:** Karnaugh-Map: Three-Variable Karnaugh Map, Four-variable Karnaugh Map, Five-variable Karnaugh Map, Boolean functions in POS form, Minimization with Karnaugh Map, Standard POS form from Karnaugh Map, Simplification of Incompletely Specified Functions.

**Unit VI:** Principle of Quine-McClusky Method, Generation of Prime Implicants, Determination of the Minimal Set of Prime Implicants, Simplification of Incompletely Specified functions

**Unit VII:** Logic Gates, Truth Table, AND Gate, OR-Gate, NOT Gate, NAND Gate, NOR Gate, X-OR Gate, X-NOR Gate

**Unit VIII:** Combinational Circuit, Multiplexer and Demultiplexer, Multiplexer, Demultiplexer, Encoder and Decoder, Encoder, Decoder, Half adder and Full adder.

### Block III

**Unit IX:** Sequential Circuit: Flip Flops, RS Flip-Flop, D Flip-Flop, JK Flip-Flop, T Flip-Flop, Master-Slave Flip-Flop

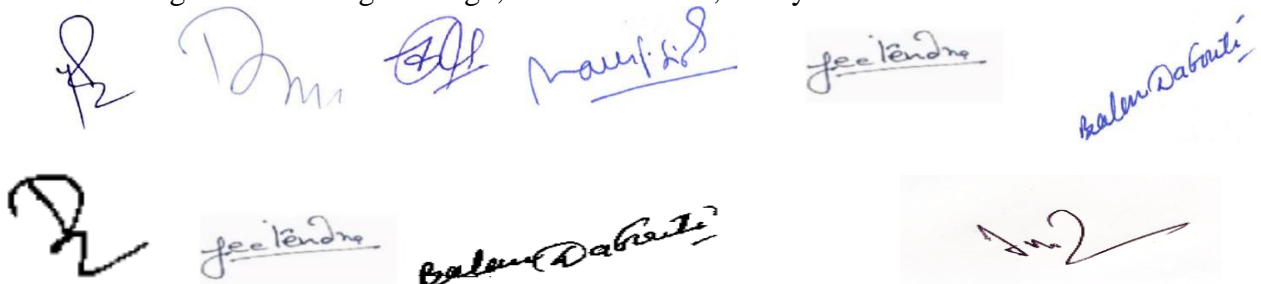
**Unit X:** Shift registers: Types of shift registers, Serial Input, Serial Output (SISO) Shift Register, Serial Input, Parallel Output (SIPO) Shift Register, Parallel Input, Serial Output (PISO) Shift Register, Parallel Input, Parallel Output (PIPO) Shift Register, Application of Shift register.

**Unit XI:** Asynchronous (ripple) counter, Synchronous counter, Working of a three-stage synchronous counter, Decade counter (MOD 10 Counter), Ring Counter, Johnson counter.

**Unit XII:** Introduction to Semiconductor Memories, Read Only Memory (ROM), ROM Size, Random Access Memory(RAM), SRAM vs DRAM, READ Operation in RAM, WRITE Operation in RAM, Flash Memory, Memory Expansion

### Reference books:

1. Digital Design, M. Morris Mano
2. Maini, "Digital Electronics: Principles and Integrated Circuits", Wiley India
3. Digital Systems: Principles and Design, Raj Kamal, Pearson
4. Balbanian, Digital logic design, Wiley India
5. Switching Circuit & Logic Design, Hill & Peterson, Wiley

The bottom of the page contains several handwritten signatures and marks in blue ink. From left to right, there is a stylized 'R', a signature that appears to be 'Dm', a signature that appears to be 'Raj', a signature that appears to be 'Maini', a signature that appears to be 'Hill', a signature that appears to be 'Peterson', a signature that appears to be 'Balbanian', a signature that appears to be 'Wiley India', a signature that appears to be 'Pearson', a signature that appears to be 'Wiley', and a signature that appears to be 'Hill & Peterson'.

# Data Structure and Program Methodology

## MCS-405

### Block I

**Unit I:** Introduction: What is Data Structure, Methods of Interpreting bit setting, Types of Data Structure.

**Unit II:** Introduction to Algorithms: Time Complexity, Recurrence.

**Unit III:** Linear Data Structure: Introduction to Stack, Introduction to Queue

**Unit IV:** Linked List : Inserting and Removing Nodes from a list, Linked Implemented of Stacks, Getnode and Freenode Operation, Linked Implemented of Queue, List Implementation of Priority Queue, Header Nodes, Circular Lists, Doubly linked list

### Block II

**Unit V:** Sorting: Introduction to Sorting, Sink Sort, Selection Sort, Merge Sort, Quick Sort, Radix Sort.

**Unit VI:** Searching: Introduction to Searching, Linear Search, Binary Search.

**Unit VII:** Representation and Traversal: Representation and Traversal, Königsberg Bridge Problem.

**Unit VIII:** Basic Algorithms: Minimum Spanning Tree, Single Source Shortest Path.

### Block III

**Unit IX:** Binary Tree: Array Representation of Binary Tree, Linked Representation of Binary Tree.

**Unit X:** Heap Sort

**Unit XI:** Search Tree: AVL-Tree, B-Tree

**Unit XII:** Tables: Hashing Techniques

### Block IV

**Unit XIII:** Sets

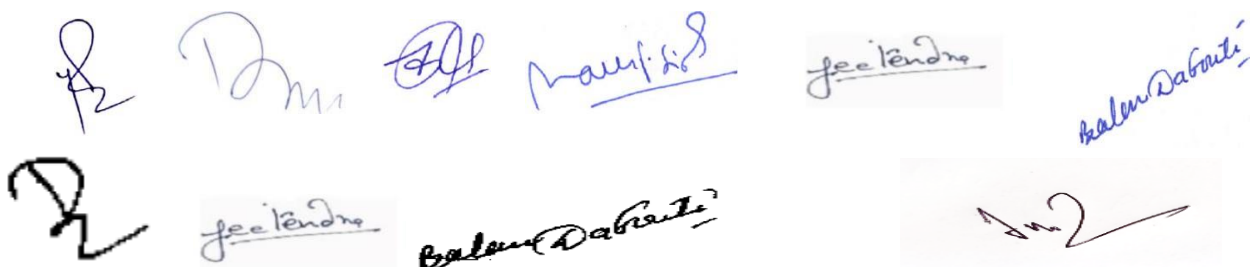
**Unit XIV:** String Algorithm: String Copy, Pattern Matching.

**Unit XV:** Program Development: Life Cycle, Code Designing, Coding, Programming Style

**Unit XVI:** Program Testing and Verification: Testing Method, Verification Procedure

### Reference Books:

1. Richard F. Gilberg and Behrouz A. Forouzan, Data Structures A Pseudocode approach with C, Thomson, 2005.
2. Robert Kruse & Bruce Leung, Data Structures & Program Design in C, Pearson Education, 2007.
3. Hubbard JR: Schaum's outline of Data Structures with C++, TMH.
4. E. Horowitz, Sahni and D. Mehta: Fundamentals of Data Structures in C++, Galgotia Publication.
5. Y. Langsam, M.J. Augenstein and A.M. Tanenbaum: Data Structures Using C and C++, Prentice Hall of India.
6. R.Kruse, C.L.Tonodo and B.Leung: Data Structures and Program Design in C, Pearson Education.

The bottom of the page features several handwritten signatures and marks in blue ink. From left to right, there is a stylized 'R', a signature that appears to be 'Dm', a signature that looks like 'All', a signature that says 'manish', a signature that says 'jeelendra', a signature that says 'balen Dabanti', a signature that says 'jeelendra', a signature that says 'balen Dabanti', and a signature that says 'An2'.

# Information Systems for Business

## MCS-406

### Block I

**Unit I:** What Is an Information System?

**Unit II:** Hardware

**Unit III:** Software

**Unit IV:** Data and Databases

### Block II

**Unit V:** Networking and Communication

**Unit VI:** Information Systems Security

**Unit VII:** Does IT Matter?

**Unit VIII:** Business Processes

### Block III

**Unit IX:** The People in Information Systems

**Unit X:** Information Systems Development

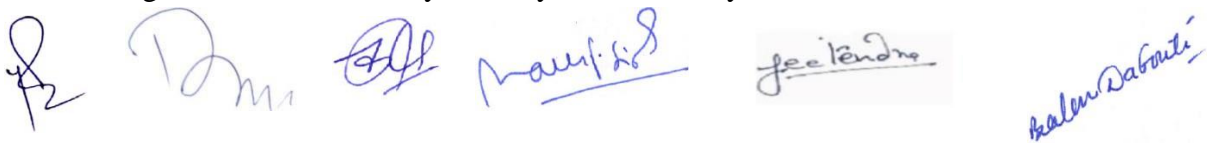
**Unit XI :** Globalization and the Digital Divide

**Unit XII:** The Ethical and Legal Implications of Information Systems

**Unit XIII:** Future Trends in Information Systems

### Reference Books:

1. Management Information Systems by Obrien, Marakas and Ramesh Behl, TMGH
2. Management Information Systems by Jawadekar, TMGH, 4th Edition
3. Management Information Systems by Jaiswal and Mittal, Oxford University Press
4. Decision Support Systems and Intelligent Systems by Turban and Aronson, Pearson Education Asia
5. Management Information Systems by C.S.V.Murthy

A row of handwritten signatures and stamps. From left to right: a signature 'R2', a signature 'Dm', a signature 'All', a signature 'manish', a rectangular stamp with the word 'feelendro' written in a cursive script, and a signature 'balen Dabanti'.

A row of handwritten signatures and stamps. From left to right: a signature 'R2', a rectangular stamp with the word 'feelendro' written in a cursive script, a signature 'balen Dabanti', and a signature 'R2'.

# Discrete Mathematics

## MCS-501

### Block-I

#### Unit I

Set Theory, Definition of Sets, Notations; Types of Sets, Relation between Sets, Operations on Sets, Venn Diagrams: Definition, Complements, Cartesian Product, Power Sets, Counting Principles: Product Rule, Sum Rule, Subtraction Rule, Division Rule; Cardinality, Countability: Countable sets, Uncountable Sets, Basic Set Identities & proofs, Pigeonhole Principle

#### Unit II

Relation, Definition of Relation: Notations; Types of Relations: Inverse relation, Combined relation, Composition of Relation, Domain & Range, Pictorial Representation: Matrix, Arrow Diagram, Directed Graph; Properties of Relation: Reflexive, Symmetric, Transitive, Irreflexive, Antisymmetric, Partial Ordering.

#### Unit III

Function, Definition, Classification, Types of Function: Into, Onto, One-one, many-one, One-one into, One-one onto, Many one into, Many one onto, Identity, Constant, Composition of Function, Recursively Defined Function

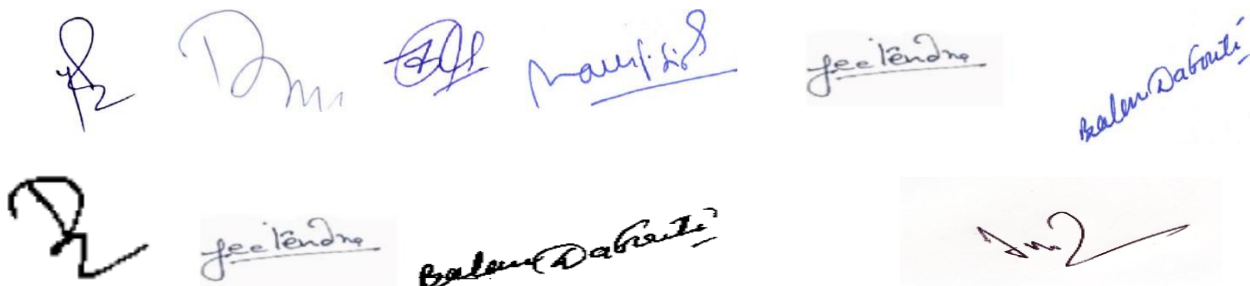
#### Unit IV

Propositional Logic, Propositions: Elements of Propositions, Propositional Variable; Basic Logic: Logical Connectives, Truth Tables; Tautologies, Contradiction, Normal Forms: Elementary Product, Elementary Sum, Conjunctive, Disjunctive, Principal Disjunctive Normal Form, Principal Conjunctive Normal Form.

### Block-2

#### Unit-I

Inference, Rules of Inference, Modus Ponens, Modus Tollens: Formal Notation, Relation with modus tollens; Validity: Validity of an argument, Validity of a statement; Predicate Logic, Quantification: Universal Quantification, Existential Quantification.



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## Unit-II

Notion of proof, Proof by implication, Converse, Inverse, Contrapositive, Negation, Contradiction  
Direct proof, Proof by truth table: Proof of tautology, Proof by counter example.

## Unit-III

Combinatorics, Mathematical induction: Principle of strong mathematical induction, Recursive  
Mathematical definitions: Recursively defined Functions, Recursively defined Sets; Basics of  
counting: Sum Rule, Product Rule, Counting ways of forming numbers from a set of digits,  
Inclusion – Exclusion principle, Permutations and Combinations

## Unit-IV

Recurrence Relation, Definition, Modeling with Recurrence Relations, Order and degree of  
Recurrence Relations, Linear homogenous Recurrence Relations: Solving linear homogeneous  
recurrence relations with constant coefficients, Solving linear non-homogeneous recurrence  
relations with constant coefficients.

## Block-3

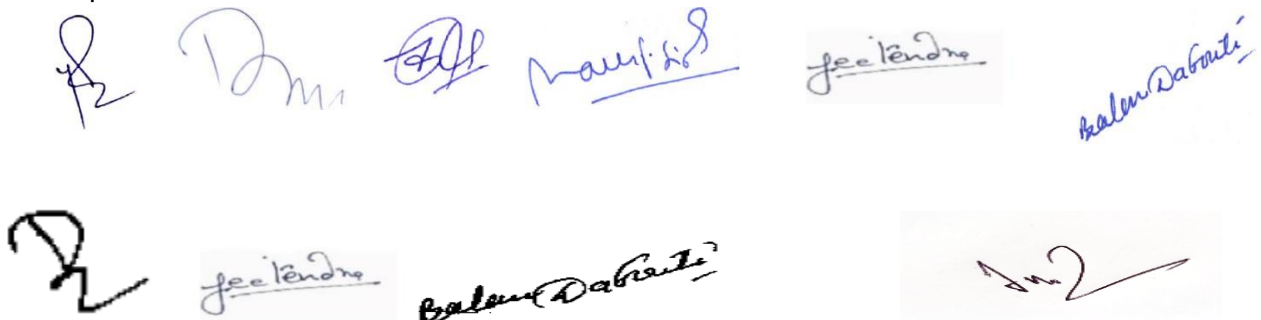
## Unit-I

Generating function, Closed form expression: Definition of Generating Function, Some special  
generating function; Properties of Generating Function, Solution of Recurrence Relation using  
Generating Function, Solution of combinatorial problem using Generating Function.

## Unit-II

Algebraic Structure, Introduction, Binary Composition & its properties: Closure Law, Associative  
Law, Existence of identity element, Existence of Inverse element, Commutative Law;  
Definition of algebraic structure.

Group, Overview: Definition, Abelian Group, Properties of Group, Groups Semi group; Monoid  
Groups.



### Unit-III

Generating function, Sub Groups: Cosets, Index of subgroup, Centralizer and Normalizer, Order of a group Lagrange's Theorem; Cyclic Group, Permutation Group: Equality of two permutations, Identity permutation, Product of permutation, Inverse permutation, Cyclic Permutation; Rings: Commutative ring, Ring & unity, Zero divisor of a ring, Subrings, Ring Homomorphism, Integral Domain, Division Ring (Skew Field); Fields.

### Block-4

### Unit-I

Graph Theory, Basic Terminology, Types of Graph: Simple Graph, Multi-graph, Trivial Graph and Null Graph, Pseudo-graph, Complete Graph, Regular Graph, Bipartite Graph, Platonic Graph, Weighted Graph Connected Graphs; Connected Graph & its Components, Euler graph, Hamiltonian path and circuits, Graph coloring & Chromatic number.

### Unit-II


Trees, Definition, Types of tree: Rooted, Binary; Properties of trees, binary search tree, Tree traversing.

### Unit-III

Finite Automata, Basic Concept of Automation theory: Alphabet & Words, Language, Grammars: Types of Grammars, Chomsky Hierarchy; Deterministic Finite Automation (DFA): Transition Function, Transition Table; Non Deterministic Finite Automata, Minimization of finite Automation, Mealy, Moore Machine.

### Suggested Reading:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.Graw Hill, 2002.
2. J.P.Tremblay & R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science" Mc.Graw Hill, 1975.
3. V. Krishnamurthy, "Combinatorics: Theory and Applications", East-West Press.
4. Seymour Lipschutz, M.Lipson, "Discrete Mathematics" Tata McGraw Hill, 2005.
5. Kolman, Busby Ross, "Discrete Mathematical Structures", Prentice Hall International.





# Object-Oriented Programming through C++

## MCS-502

### BLOCK - 1

#### UNIT 1: Principles of object oriented programming

Object oriented programming paradigm, Comparison with procedural programming, Basic concepts of object oriented programming, benefits of OOP, object oriented Languages, advantage of C++.

#### UNIT 2: Object Orient Programming System

Class, inheritance, abstraction, encapsulation and information hiding, polymorphism, overloading.

#### UNIT 3: Advanced concept

Dynamism (Dynamic typing., dynamic binding, late binding, dynamic loading). Structuring programs, reusability, organizing object oriented project,

### BLOCK - 2

#### UNIT 5: Overview of C++

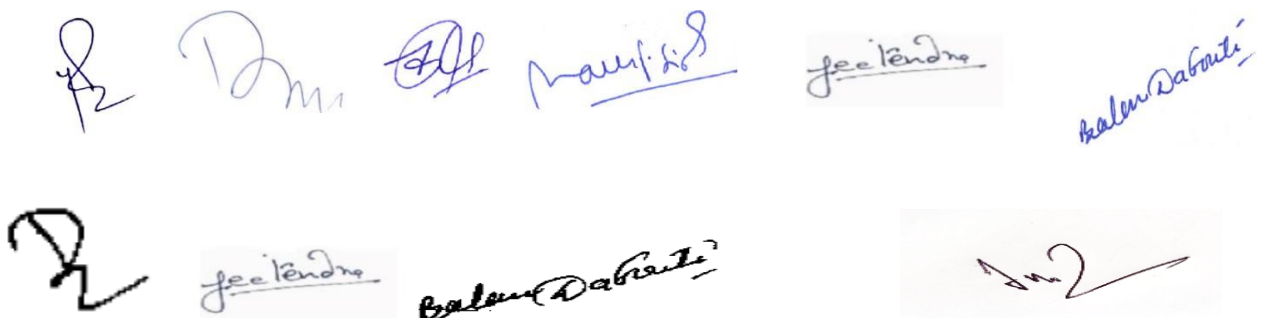
Tokens, keywords, identifiers and constants basic data types, user-defined and derived Data types, type compatibility, reference, variables type Casting, operator precedence, control structures, structure, function.

#### UNIT 6: Classes and objects

Class specification, class objects, accessing class members, scope resolution operator, data hiding, empty classes, Pointers within a class, passing objects as arguments, returning objects from functions, friend Functions and friend classes, constant parameters and member functions, structures and Classes, static members.

#### UNIT 7: Object initialization and cleanup

Constructors destructor, constructor overloading. order of construction and destruction,



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Constructors with default arguments, nameless objects, dynamic initialization through , Constructors, constructors with dynamic operations, constant objects and constructor, static Data members with constructors and destructors, nested classes.

### **BLOCK - 3**

#### **UNIT 8: Operator overloading and type conversion**

Defining operator overloading, overloading unary operators, overloading binary operators, overloading binary operators using friends, manipulation of strings using Operators, rules for overloading operators. type conversions.

#### **UNIT 9: Inheritance: extending classes**

Deriving derived classes, single multilevel, multiple, hierarchical, hybrid inheritance, Constructors & destructors in derived classes, constructors invocation and data members Initialization, virtual base classes, abstract classes, delegation.

### **BLOCK- 4**

#### **UNIT 10: Pointers, virtual functions and polymorphism**

Pointers to objects, this pointer. pointers to derived classes, virtual functions, Implementation of run-time polymorphism, pure virtual functions.

#### **UNIT 11: Working with files**

Classes for file stream operations. opening and closing a file, file pointers and their Manipulations, sequential input and output operations, error handling during file Operations, command line arguments.

#### **UNIT 12: Object Oriented Modeling**

Need of object oriented Modeling, Simulation of real life problems using OOP concept: Example, Representation of problem using object and class diagrams at design level.





# Software Engineering

## MCS- 503

### Block I

Unit I: Introduction to software engineering

- 1.1 Basic issues in software engineering
- 1.2 Structured programming

Unit II: Software life cycle model

- 2.1 Basics of software life cycle and waterfall model
- 2.2 Prototyping and spiral life cycle models

Unit III: Requirements analysis and specification

- 3.1 Basic concepts in requirement analysis and specification
- 3.2 Formal requirement specification
- 3.3 Algebraic specification

Unit IV: Software design issues

- 4.1 Basic concepts in software design
- 4.2 An overview of current design approaches

### Block II

Unit V: Function-oriented software design

- 5.1 Data flow diagrams
- 5.2 DFD model of a system

Unit VI: Basic concepts in object creation

- 6.1 Structured design

Unit VII: Object modeling using UML

- 7.1 Basic ideas on UML
- 7.2 Use case model
- 7.3 Class and interaction diagrams
- 7.4 Activity and state chart diagram

Unit VIII: Object oriented software development

- 8.1 Design Patterns
- 8.2 Domain Modeling

Unit IX: User interface design

- 9.1 Basic Concepts in User Interface Design
- 9.2 Types of User Interfaces
- 9.3 Component-Based GUI Development

### Block III

Unit X: Coding and testing

- 10.1 Code Review
- 10.2 Black-Box Testing
- 10.3 White-Box Testing

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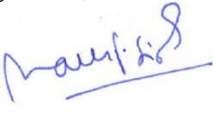
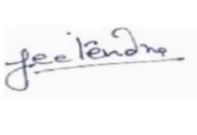

- 10.4 Debugging, Integration and System Testing
- Unit XI: Software project planning
  - 11.1 Project Planning and Project Estimation Techniques
  - 11.2 COCOMO Model
  - 11.3 Staffing Level Estimation and Scheduling
- Unit XII: Software project monitoring and control
  - 12.1 Organization and Team Structures
  - 12.2 Risk Management and Software Configuration Management
- Unit XIII: Software reliability and quality management
  - 13.1 Software Reliability Issues
  - 13.2 Statistical Testing and Software Quality Management
  - 13.3 ISO 9000
  - 13.4 SEI CMM

#### Block IV

- Unit XIV: Software maintenance
  - 14.1 Characteristics of Software Maintenance
- Unit XV: Computer aided software engineering
  - 15.1 Basic ideas on CASE Tools
  - 15.2 Different Characteristics of CASE Tools
- Unit XVI: Software Reuse
  - 16.1 Basic ideas on Software Reuse
  - 16.2 Reuse Approach
- Unit XVII: Client server software development
  - 17.1 Basic Ideas on Client-Server Software Development and Client-Server Architecture
  - 17.2 CORBA and COM/DCOM.

#### Suggested Reading:

1. Pressman: Software Engineering, Tata McGraw Hill.
2. Jalote, Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.
3. Fairley, R.E.: Software Engineering Concepts, McGraw-Hill.
4. Lewis, T.G.: Software Engineering, McGraw-Hill.
5. Mall, Rajib: Fundamental of Software Engineering, Third Edition, PHI
6. Ghezzi, Carlo: Fundaments of Software Engineering, PHI.
7. Shere: Software Engineering & Management, Prentice Hall.

# Operating System

## MCS- 504

### Block-1

#### Unit I

Introduction to Operating system, User and System View, The Evolution, Operational View, Processes and Tools, Trends in Computing, Parallel Computing, Real - Time Systems, Wireless Systems.

#### Unit II

File Systems and Management, What Are Files?, File Types and Operations, File Access Rights, File Access and Security Concerns, File Storage Management, Inode in Unix, File Control Blocks, The Root File System, Block-based File Organization, Policies In Practice, Disk Partitions, Portable storage

#### Unit III

Introduction to Processes and Process management, What is a Process, Main Memory Management, Files and IO Management, Process Management, Processor Utilization, Response Time, Process States, A Queuing Model, Scheduling, Choosing a Policy, Policy Selection, Comparison of Policies, Pre-emptive Policies, How to Estimate Completion Time, Exponential Averaging Technique, Multiple Queues Schedules, Two Level Schedules, Kernel Architecture, System Calls, Layered Design, The Virtual Machine Concept, System Generation, Linux: An Introduction, The Linux Distribution, Linux Design Considerations, Components of Linux.

#### Unit IV

Introduction to Memory management , Main Memory Management, Memory Relocation Concept, Compiler Generated Bindings, Linking and Loading Concepts, Process and Main Memory Management, The First Fit Policy: Memory Allocation, The Best Fit Policy: Memory Allocation, Fixed and Variable Partitions, Virtual Storage Space and Main Memory Partitions,

*[Handwritten signatures and marks]*

Virtual Memory: Paging, Mapping the Pages, Paging: Implementation, Paging: Replacement, Page Replacement Policy, Thrashing, Paging: HW support, The TLB scheme, Some Additional Points, Segmentation.

## **Block II**

### **Unit V**

Introduction to Input Output (IO) Management, Issues in IO Management, Managing Events, IO Organization, Programmed Data Mode, Polling, Interrupt Mode, Issues in Handling Interrupts, DMA Mode of Data Transfer, A Few Additional Remarks, HW/SW Interface, Device Drivers, Handling Interrupt Using Device Drivers, Management of Buffers, Some Additional Points, Motivation For Disk Scheduling, Disk Scheduling Policies.

### **Unit VI**

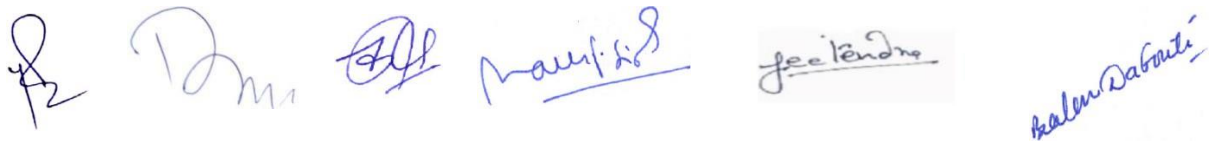
Introduction to Resource sharing and Management, Need for Scheduling, Mutual Exclusion Deadlocks, Deadlock Prevention Method, Deadlock Detection and Prevention Algorithms Mutual Exclusion Revisited: Critical Sections, Basic Properties of Semaphores, Usage of Semaphore, Some Additional Points.

### **Unit VII**

Introduction to Inter-Process communication, Creating A New Process: The *fork()* System Call, Assigning Task to a Newly Spawned Process, Establishing Inter-process Communication Pipes as a Mechanism for Inter-process Communication, Shared Files, Shared Memory Communication, Message-Based IPC, Signals as IPC.

### **Unit VIII**

Introduction to Real-time Operating Systems and Microkernels, Characteristics of real-time systems, Classification of Real-time Systems, Microkernels and RTOS, OS for Hand-held Devices, Rate Monotonic Scheduling, Earliest Deadline First Policy, Earliest Least Laxity First Policy, Priority Inversion.





### Block III



feelendro

Balant Dabanti



## Unit IX

Introduction to OS and Security, Security Breaches, Examples of Security Breaches, Attack Prevention Methods, User Authentication, Security Policy and Access Control.

## Unit X

Introduction to Unix Primer, Motivation, Unix Environment, Unix File System, Some Useful Unix Commands, Unix Portability. Search and Sort Tools, *grep*, *egrep* and *fgrep*, Using *find*, SortTool, AWK Tool in Unix The Data to Process, AWK Syntax, Programming Examples, Some One-liners, AWK Grammar, More Examples, More on AWK Grammar.

## Unit XI

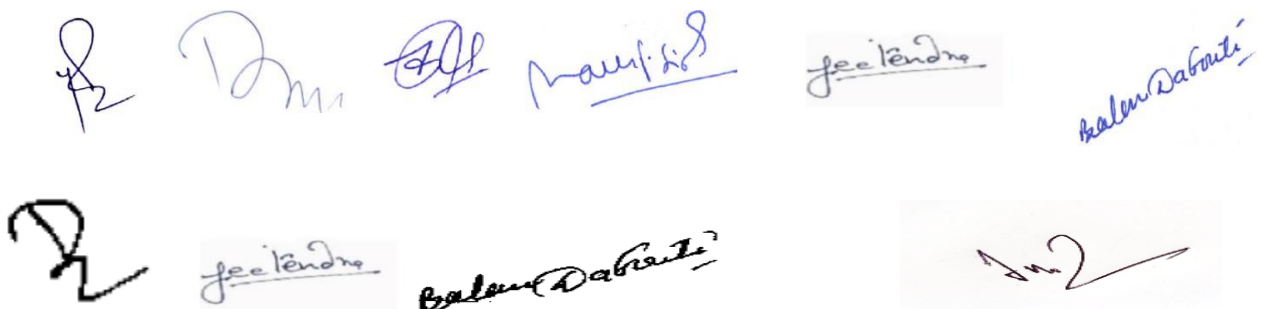
Shell Scripts in UNIX, Facilities Offered by Unix Shells, The Shell Families, Subshells, The Shell Programming Environment, Some Example Scripts, Example Shell Scripts, Unix Kernel Architecture, User Mode and Kernel Mode, System Calls, An Example of a System Call, Process States in Unix, Kernel Operations, The Scheduler, Linux Kernel  
Linux Sources and URLs

## Unit XII

Make Tool In UNIX, When to Use Make, How Make Works?, Macros, Abstractions, and Shortcuts, Inference Rules in Make, Some Additional Options, Mastermakefiles, Some Other Tools in UNIX, Tar and Other Utilities, Compression, Image File Formats for Internet Applications, Performance Analysis and Profiling, Source Code Control System in UNIX, How Does Versioning Help, The SCCS, How This Is Achieved?, SCCS Command Structure, An Example Session, CVS : Concurrent Versioning System.

## Unit XIII

X Windows in UNIX, Graphical User Interface (GUI), X-Window System, Some Standard X-



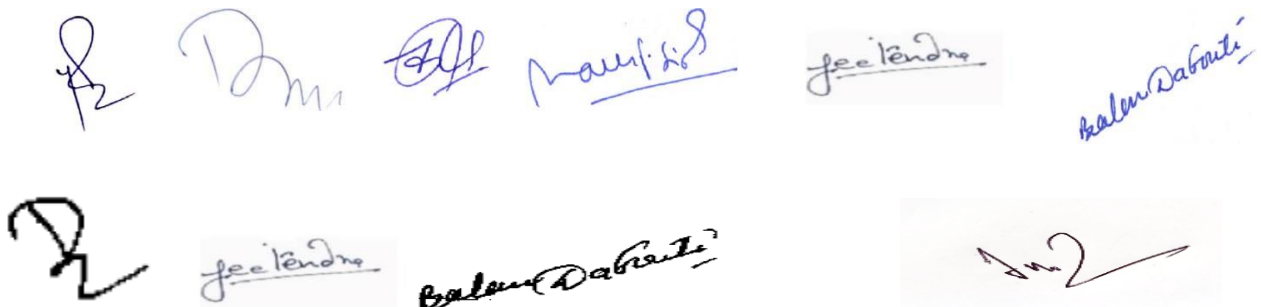
clients, Hosts, Selecting a host for Display, X-Utilities, Startup, Motif and X. System Administration in UNIX, Unix Administration Tasks, Administration Tasks List Starting and Shutting Down, Managing User Accounts, The .rcFiles, Sourcing Files Device Management and Services, The Terminal Settings, Printer Services, Disk space allocation and management.

#### **Unit XIV**

More on LINUX (Linux Kernel Architecture), Linux Kernel:Hardware, The Linux Kernel Purpose of the Kernel, TheLinux Kernel Structure Overview, Process Management Scheduler, The Memory Manager, The Virtual File System (VFS), The Network Interface, Inter Process Communication, System Calls, Systems Call Interface in Linux, The Memory Management Issues, Linux File Systems, *Device specific files*, The Virtual File system, The VFS Structure andfile management in VFS, The Second Extended File System (EXT2FS), Advanced Ext2fs features, Physical Structure, The EXT3 file system, THE PROC FILE SYSTEM, DEVICE DRIVERS ON LINUX, Device classes, Block devices, Network devices, Major/minor numbers, Character Drivers, Important Data Structure, The file operations structure(fops):<linux/fs.h>, Advance Char Driver Operations, Blocking and non-blocking operations, Asynchronous Notification, Interrupt Handling in LINUX 2.4, Top Half And Bottom Half Processing, Linux Installation, The Installation, The Installation Program, Finishing the installation.

#### **Suggested Reading:**

1. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley-Indian Edition (2010).
2. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).
3. Principles of Operating Systems by Naresh chauhan, Oxford Press (2014).
4. Operating Systems by D.M. Dhamdhare, Tata McGraw Hill 2nd edition.
5. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000.
6. UNIX Concepts and Applications(4th Edition)– by Sumitabha Das, Tata McGraw Hill.



Handwritten signatures and names in blue ink, including "fz", "Dm", "A", "naresh", "jeetendra", "balen Dabarti", "jeetendra", "balen Dabarti", and "fz".

# MCS-505

## DBMS

### Block I

#### Unit-I

Introduction to DBMS, Database system and application, Purpose of database system, Characteristics and Benefits of a Database, Components of DBMS, Merits and Demerits of DBMS, Database Architecture, Traditional file systems, View of data, Database language languages , Data Dictionary, Types of DBMS: Centralized DBMS, Parallel DBMS, Distributed DBMS, Client-Server DBMS; Relational databases, Database Design, Database Administrator.

#### Unit-II

Introduction to Data Model, What is Data Model, Need for Data Model, Types of Data Model ER Model

#### Unit-III

Introduction, What is Relational data model, Relation, Tuple, Attribute, Cardinality, Degree, Domain

### Block II

#### Unit-IV

Introduction to SQL, Characteristic of SQL ,Basic Structure of SQL Queries , Basic Data Types SQL Commands, Useful Relational Operator , Aggregate Functions, SUM function.

#### Unit-V

Introduction, Compound Conditions and Logical Operators, AND Operator, OR Operator Combining AND and OR Operators ,IN Operator, BETWEEN Operator, NOT Operator Order of Precedence for Logical Operators, LIKE Operator, Concatenation Operator, Alias Column Names, ORDER BY Clause, Handling NULL Values

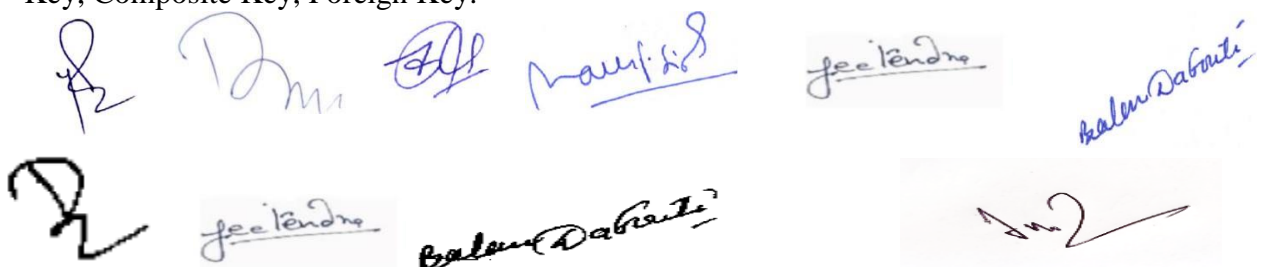
#### Unit-VI

Introduction to Normalization, Normalization and Its Objectives, Normal Forms: First Normal Form (1NF),Second Normal Form (2NF),Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF), Fourth Normal Form (4NF), Fifth Normal Form (5NF)

### Block-III

#### Unit-VII

Introduction to keys, Keys, Types of Keys: Super Key, Candidate Key, Primary Key, Alternate Key, Composite Key, Foreign Key.



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## Unit-VIII

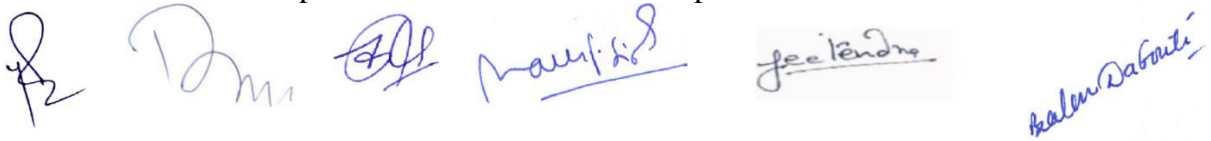
Introduction to database recovery and security, Back up of Database: SQL Server Backup – Scopes and Types, Backup Scopes, Backup Types, Back Up Tools, Types of Database Failure, Types of Database Recovery: Developing a Backup and Recovery Strategy, General Types of Recovery, Structure of Recovery, Recoverable Database Backup Operations, Automated Backup Operations; Database Security.

## Unit-IX

Introduction, Model Concept: Basic Terminology, Relational Schema and Instances; Integrity Constraints: Entity Integrity Constraints, Referential Integrity Constraints; Domain Constraints, the CODD Commandments.

### Suggested Reading:

1. An introduction to Database Systems, C J Date, Addison-Wesley.
2. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill.
3. Understanding SQL by Martin Gruber, BPB
4. SQL- PL/SQL by Ivan bayross
5. Oracle – The complete reference – TMH /oracle press

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A row of handwritten signatures and stamps. From left to right: a stylized 'R', a stamp with the word 'feelendro', a signature 'balen Dabanti', and a signature 'Rm'.

# Introduction to Computer Network

## MCS-506

### Block 1

#### Unit I

Introduction to computer network, Historical background of computer network, network topologies, Classification Based on Transmission Technology, Broadcast Networks, Point to point networks, LAN, WAN, MAN, internet, application of internet.

#### Unit II

Introduction to transmission media, guided transmission, unguided transmission, Introduction to Transmission Impairments and Channel Capacity, attenuation, Delay distortion, Noise, Bandwidth and Channel Capacity.

#### Unit III

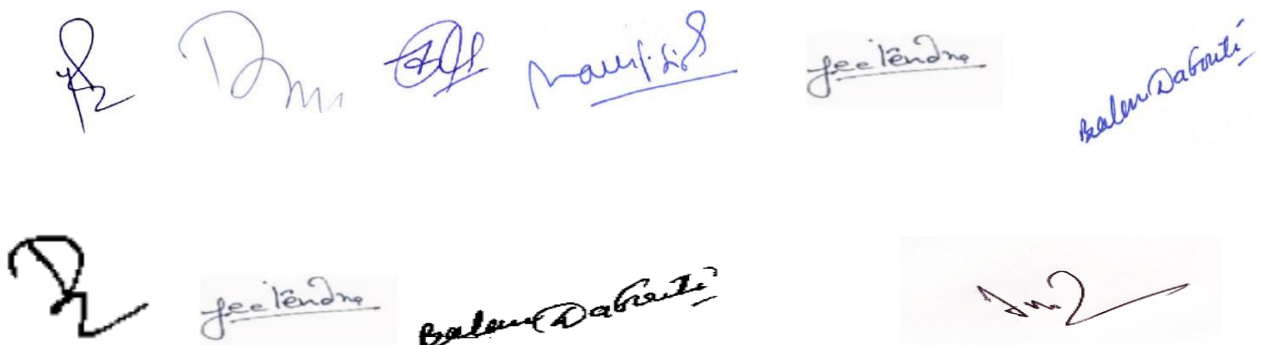
Introduction to Network Topology, Mesh Topology, Bus Topology, STAR Topology, Ring topology, Tree Topology, Unconstrained Topology, Combination of topology and transmission media. Introduction to Medium Access Control (MAC), Goals of MACs, Round Robin Techniques Polling, Token Passing, Contention-based Approaches, ALOHA, CSMA, CSMA/CD. Introduction to IEEE CSMA/CD based LANs, IEEE 802.3 and Ethernet, Ethernet - A Brief History, 5.3.2.2 Ethernet Architecture, Encoding for Signal Transmission, The Ethernet MAC Sublayer, The Basic Ethernet Frame Format ,Other important issues.

#### Unit IV

Introduction to IEEE Ring LANs and High Speed LANs –Token Ring Based, Token Ring (IEEE 802.5), Token Ring Operation, Priority System, Ring Maintenance, Physical Layer Frame Format, Token Bus (IEEE 802.4), Functions of a Token Bus, Frame Form, Logical ring maintenance, Relative comparison of the three standards.

#### Unit V

Introduction to High Speed LANs – Token Ring Based, FDDI, Medium, Topology, Fault Tolerance, Frame Format Media Access Control, FDDI and the OSI model, Comparison, Introduction to High Speed LANs – CSMA/CD, Successors of Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet and Brief History and the IEEE 802.3z Task Force, Similarities and advances over Ethernet (IEEE 802.3), Gigabit Ethernet Protocol Architecture GMII (Gigabit Media Independent Interface), Media Access Control Layer.



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## Block II

### Unit VI

Introduction to Wireless LANs, Transmission Media, Infrared, Microwave, Radio, Topology

Medium Access Control, Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA), Framing, Security, IEEE 802.11 extensions.

### Unit VII

Introduction to Bluetooth, Topology, Bluetooth Architecture, Bluetooth Layers ,Layer 1: Radio Layer, Layer 2: Baseband Layer, Layer 3: Link Manager Protocol, Layer 4: Host Controller Interface, Logical Link Control and Adaptation Protocol, Layer 6: Radio Frequency Communication (RFCOMM), Layer 7: Service Discovery Protocol, Telephony Control Protocol Spec (TCS), Application Program Interface (API) libraries

### Unit VIII

Introduction Cellular Telephone Networks, Cellular Telephone System, Frequency Reuse Principle, Transmitting and Receiving, Mobility Management, Medium Access Control Techniques, First Generation Second Generation System, Second Generation , Third Generation.

### Unit- IX

Introduction to Internetworking Devices, Repeaters, Hubs, Bridges, Transparent Bridges, Bridge Forwarding, Bridge Learning , Source Routing Bridges, Switches, Routers, Gateways A Simple Internet.

### Unit X

Introduction to Internet Protocol (IP), Addressing, IP Addressing, Subnetting, Network Address Translation (NAT), Address Resolution Protocol (ARP), IP Datagram, Multiplexing and Demultiplexing, Fragmentation and Reassembly, ICMP, IPV6

### Unit XI

Introduction to Transport and Application Layer Protocols, User Datagram protocol (UDP) Transmission Control Protocol (TCP), Client-Server Paradigm and its Applications.

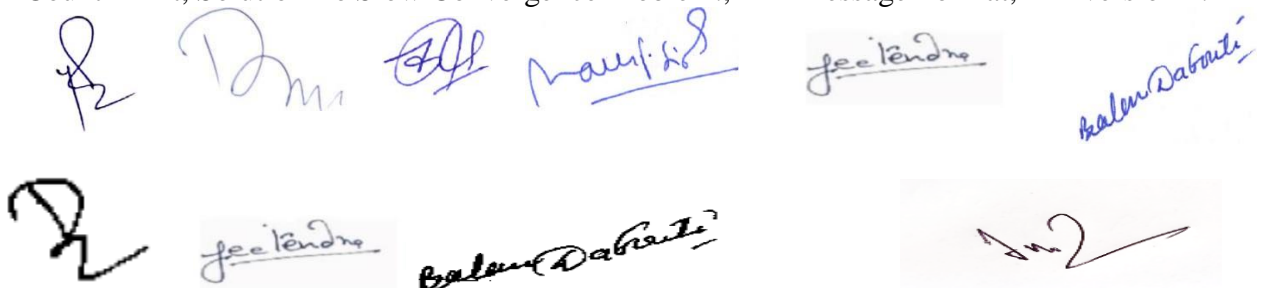
### Unit XII

Introduction to Routing and Congestion Control, Classification of Routers, Routing Algorithm Metrics, Fixed or Static Routing, Flooding, Intradomain versus Interdomain

## Block III

### Unit XIII

Introduction to RIP – Routing Information Protocol, Routing Table Format, RIP Timers, Hop-Count Limit, Solution To Slow Convergence Problem., RIP Message Format, RIP version 2.



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## Unit XIV

Introduction to Open Shortest Path First (OSPF) and Border Gateway Protocol (BGP)  
Link-State Algorithm, Routing Hierarchy in OSPF, OSPF Message Format, Additional OSPF Features, Introduction to Border Gateway Protocol, BGP Characteristics, BGP Functionality and Route Information Management, BGP Attributes, BGP Path Selection, BGP Message type, BGP Fixed Header Format, BGP OPEN Message, BGP UPDATE Message, BGP NOTIFICATION Message, BGP KEEPALIVE Message

## Unit XV

Introduction to Congestion Control, Causes Of Congestion, Effects of Congestion, Congestion Control Techniques, Leaky Bucket Algorithm, Token Bucket Algorithm, Congestion control in virtual Circuit, Choke Packet Technique, Hop-by Hop Choke Packets Load Shedding, Slow Start - a Pro-active technique, Flow Control Versus Congestion control.

## Unit XVI

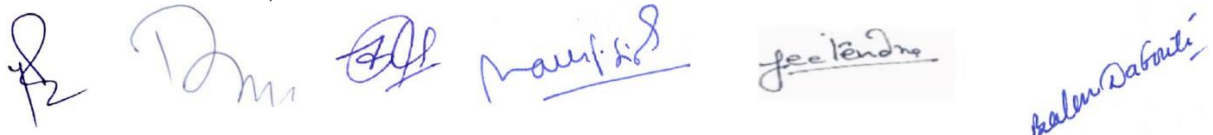
Introduction to Cryptography and Secured Communication, Symmetric Key Cryptography Monoalphabetic Substitution, Polyalphabetic Substitution, Transpositional Cipher Block Ciphers, Data Encryption Standard(DES), Encrypting a Large Message, Triple DES, Public key Cryptography, RSA, Introduction to Secured Communication, Security Services, Privacy, Authentication, Integrity and Nonrepudiation using Digital Signature, User Authentication using symmetric key cryptography, User Authentication using Public Key Cryptography, Key Management, Application Layer Security, Virtual Private Network (VPN)

## Unit XVII

Introduction to Firewalls, Why a Firewall is needed?, Access Control Policies, Firewall Capabilities, Limitations of a Firewall, Types of Firewalls, Bastion Host, Network Address Translation, Firewall Configurations, Active Firewall Elements.

### Suggested Reading:

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher, 2011.
5. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.

A row of six handwritten signatures in blue ink. From left to right: a stylized 'R', 'Dm', 'AHS', 'maurice', 'jeetendra', and 'balen Dabanti'.

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## Design and Analysis of Algorithm

**MCS -507**

**Syllabus and course contents are adopted from the course contents available at ePGPathshala**

<https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7>

Dr. Dm. Zilmanovich

feeländno

Balun Dabuti

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*Balant Dabanti*

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# Programming in JAVA

## MCS-508

### Block 1: Object Oriented Methodology and Java

#### Unit 1: Object Oriented Programming

Paradigms of Programming languages, Evolution of Object Oriented Methodology, Basic Concepts of OO Approach, Comparison of object oriented and procedure - oriented Approaches, Benefits of OOPS, Applications of OOPS. Classes and objects, Abstraction and Encapsulation, Inheritance, Method overriding and Polymorphism.

#### Unit 2: Java Language Basics

Introduction to Java, Primitive Data Type and Variables, Java Operators.

#### Unit 3: Expressions Statements and Arrays

Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump statements, Arrays.

### Block 2: Object oriented concepts and Exceptions Handling

#### Unit 4: Class and objects

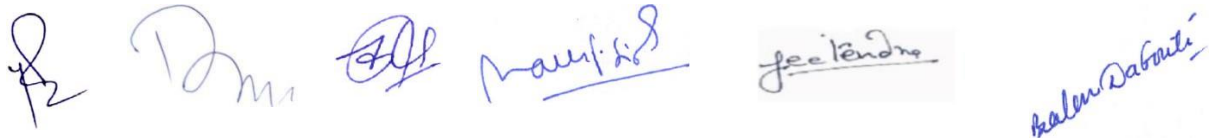
Class Fundamentals, Introducing Methods, this Keyword, Using objects as Parameters, Method overloading, Garbage collection, the finalize () Method.

#### Unit 5: Inheritance and Polymorphism

Inheritance Basics, Access, Multilevel, inheritance, Method overriding Abstract classes, Polymorphism, Final Keyword.

#### Unit 6: Packages and interfaces

Package, Accessibility of Packages, using Package members, Interfaces, Implementing interfaces, interface and Abstract classes, Extends and Implements together.

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## Unit 7: Exceptions Handling

Exception, Handling of Exception, Types of Exceptions, Throwing, Exceptions, writing Exception subclasses.

### **Block 3: Multithreading, I/O, and Strings Handling**

## Unit 8: Multithreaded Programming

Multithreading, The Main thread, JAVA Thread Model, Thread Priorities, Synchronization in JAVA, Inter thread Communication.

## Unit : I/O In Java

I/O Basics, Streams and stream, Classes, the predefined streams, Reading from and writing to console, reading and writing files, the transient and volatile Modifiers, using instance of Native Methods.

## Unit 10: Strings and Characters

Fundamental of Characters and Strings, the String class, String operations, Data Conversion using value of () Methods, Strings Buffer and Methods.

## Unit 11: Exploring Java I/O

Java I/O classes and interfaces, Stream classes, Text streams, Stream Tokenizer, Serialization, Buffered stream, print stream, Random Access file.

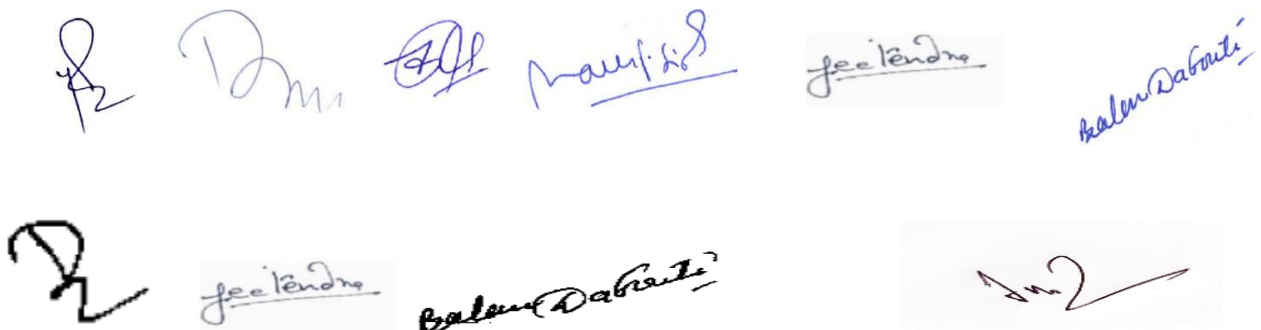
### **Block 4: Graphics and user interfaces**

## Unit 12: Applets

The applet class, Applet architecture, An applet Skeleton: Initialization and Termination, Handling events, HTML Applet TAG.

## Unit 13: Graphics and user interfaces

Graphics contexts and Graphics objects, user interface components, Building user interface with AWT, Swing - Based GUI, Layouts and layouts and layout Manager, Container.



## Unit 4: Networking Features

Socket overview, reserved parts and proxy servers, Internet Addressing: Domain Naming Services (DNS),

Java and The Net: URL, TCP/IP Sockets, Datagrams.

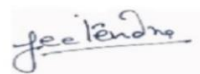
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*Handwritten signatures and text:*  
A series of handwritten signatures and text in black ink, including "Z", "feelendro", "Balen Dabuti", and "Zm2".

Programme Name & Abbreviation	Programme Code	Eligibility	Duration In Years		SLM	Mode of Exam (Annual/ Sem)	Year / Sem	Details of Fees (Rs.)							
			Min	Max				Programme	Project/ Lab Workshop	Exam	Practical	Viva-Voce	Miscellaneous	Degree Fee	Grand Total
Master of Science (Information Technology)	MSc(IT)-21	Passed BCA/BSc(CS/IT)/B.Sc. with Mathematics at 10+2 Level or at Graduation Level. Candidate not having mathematics at 10+2 or graduation will have to pass one qualifying mathematic course during the course of the programme (Sr. Secondary Mathematics paper in SWAYAM portal by Dr. Rajendra Kumar Nayak, NIOS). The equivalent courses shall be identified from time to time and the details shall be provided in the University website.  Lateral Entry(Third Semester): PGDCA from UGC recognized University with Mathematics at 10+2 or Graduation level/ 4 year degree in Computer Science Engineering or Information Technology/ A-level from DOEACC after graduation.	2	4	English	Sem	I	9500	-	1000	500	-	150		11150
							II	9500		750	500	-	-		10,750
							III	9500		1000	500				11,000
							IV	9500	1000	1000	500			300	12,300







## Project Guidelines

### Guidelines to prepare Project

The student is expected to take up any industry oriented application and develop a project on this topic preferably on C, C++, VB. The implementation should involving all the phases of software development life-cycle i.e. problem formulation, design, implementation and testing phases. Below are the guidelines for structuring and formatting of the project report.

**Qualification of Report Supervisor:** The report supervisor can be any M.Tech./MCA/M.Sc.(CS) or equivalent qualified person from the industry or academia with sufficient experience in the respective field.

### Font

1. Chapter Names - 16 TIMES NEW ROMAN (bold) all caps
2. Headings - 14 TIMES NEW ROMAN (bold) all caps
3. Subheadings - 14 TIMES NEW ROMAN (bold) Title case
4. Sub – sub headings - 12 TIMES NEW ROMAN (bold) Title case
5. Body of Project - 12 TIMES NEW ROMAN
6. Text in Diagrams - 12 TIMES NEW ROMAN (all lower case)
7. Diagrams / Table headings / Fig. Headings - 12' TIMES NEW ROMAN Title case
8. If any text 12' TIMES NEW ROMAN (Title case)

### Spacing

1. Two(2) line spacing between heading and body text.
2. 1.5 line spacing in body text.
3. New paragraphs start with single tab.

### Margins

Left 1.5' Right 1.0' Top 1.0' Bottom 1.0'

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## Page numbers

position Bottom, Middle 1. Front Pages Small Roman Numbers (Excluding title page, Certificate page, Acknowledgement page) 2. Body pages 1,2,3 ..... 3. Annexure 1,2,3.....

(Separate for each Annexure) Pages : Size : A4 paper Color: White Documentation : Spiral Binding

## Front Pages

Page 1 Title Page

Page 2 Certificate Page

3 Acknowledgement

Page 4 Contents

Page

5 Abstract

Page 6 List of Figures/ tables/ screens

Page 7 Symbols & Abbreviations

## CONTENTS

Abstract List of Figures List of Tables List of Screens Symbols & Abbreviations

1. Introduction

1.1 Motivation

1.2 Problem definition

1.3 Objective of Project

1.4 Limitations of Project

1.5 Organization of Documentation

2. LITERATURE SURVEY

2.1 Introduction

2.2 Existing System

2.3 Disadvantages of Existing system

2.4 Proposed System

2.5 Conclusion

3. ANALYSIS

3.1 Introduction

3.2 Software Requirement Specification

3.2.1 User requirement

3.2.2 Software requirement

3.2.3 Hardware requirement

3.3 Content diagram of Project

3.4 Algorithms and Flowcharts

3.5 Conclusion

4. DESIGN

4.1 Introduction

4.2 DFD / ER / UML diagram (any other project diagrams)

4.3 Module design and organization

4.4 Conclusion

5. IMPLEMENTATION & RESULTS

5.1 Introduction

5.2 Explanation of Key functions

5.3 Method of Implementation

5.2.1 Forms 5.2.2 Output Screens 5.2.3 Result Analysis

5.4 Conclusion

6. TESTING & VALIDATION

6.1 Introduction

6.2 Design of test cases and scenarios

6.3 Validation

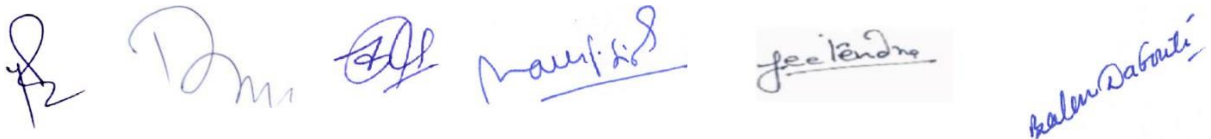
6.4 Conclusion

7. CONCLUSION : First Paragraph - Project Conclusion

Second Paragraph - Future enhancement REFERENCES

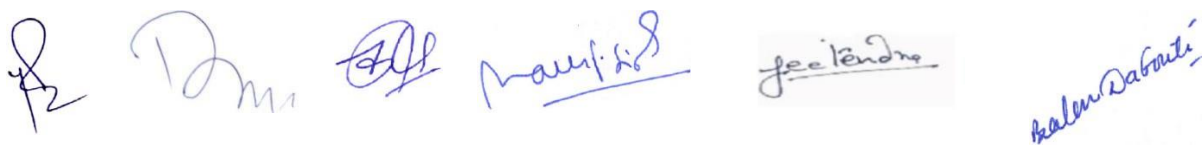
1. Author Name, Title of Paper/ Book, Publisher's Name, Year of publication

2. Full URL Address

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**A Project report on**  
**<<Title of the project>>**  
**MATER OF SCIENCE (INFORAMTION TECHNOLOGY)**

**Submitted By**  
**<< Name of the Student >>**  
**<< Enrolment No >>**  
**Under the Guidance of**  
**<< Guide Name >>**  
**<< Designation >>**  
**<<Your Study Center Name in CAPS>>**  
**<< University Logo >>**  
**School of Computer Science and IT,**  
**Uttarakhand Open University, Haldwani**  
**<<Year>>**

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**<<Your Centre Name in CAPS>>**

**School of Computer Science and IT**

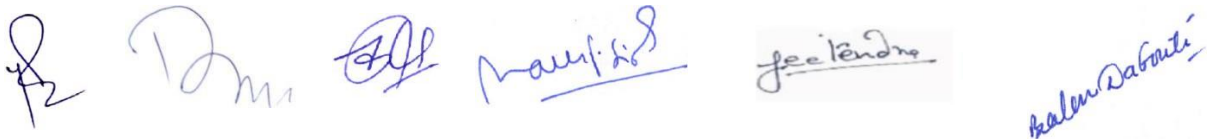
**CERTIFICATE**

This is to certify that the project report titled << Project Title >> submitted by << Student Name >>, bearing <<Enrollment No>>, in Master of Science(Information Technology) - <<Semester>> is a record bonafide work carried out by me. The results embodied in this report have not been submitted by me to any other University for the award of any degree.

**<< Student Signature>>**

**<< Supervisor Signature >>**

**<< Coordinator Signature>>**

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