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## Aim

To educate and enrich the students on setting goals, career planning and lateral thinking. Equip them on techniques of reading, learning and listening skills. Introduction to the world of Programming and Problem Solving.

## Course Objectives

To enable students to,

- Assess individual communication skills.
- Plan career
- Set Goals
- Enhance their ability to build stories and situational thinking.
- Improve their language through grammar
- Enhance techniques such as listening, non-verbal communication, verbal oral& written skills etc.

## Unit I

Assessment of individual levels of communication skills, aptitude and employability skills; Psychometric test, SWOT analysis; Planning on setting goals; Understanding the stand of students, College Ethics.

## Unit II

Introduction to Career planning; General Motivation; Communication Skills; Goal setting – Introduction to Soft Skills - Presentation skills - Intra-personal skills.

## Unit III

Reading Skills, Learning & Studying Skills, Memory Techniques, Programmed Thinking, Lateral Thinking, Creativity, Questioning & Listening Skills.

## Unit IV

Initiation, Stage Fear, Lateral Thinking; Self Introduction using an Adjective & Noun – Newspaper Assessment on Nouns; Pronouns – Passage writing by replacing noun with Pronoun; Verbs - Newspaper Assessment on Verbs; Adjectives & Adverbs; Articles - Mime the profession, Assessment for Articles; Prepositions; Past, Present and Future Tense; Situational GD & Story Telling on Tenses; Simple, Compound and Complex Sentences; Art of communication – the communication process - Word building and Role play; Exercise on English Language through symposiums and workshops. Active & Passive Voice; Sentence

Formation and Completion.

### *Unit V*

Introduction to Programming , Programing Domain : Scientific Application , Business Applications, Artificial Intelligence, Systems Programming , Web Software Categories of Programming Languages: Machine Level Languages, Assembly Level Languages , High Level Languages Programming Design Methodologies : Top Down and Bottom UP Program Development Cycle with case study, Program Execution and Translation Process ,Problem solving using Algorithms and Flowcharts, Performance Analysis and Measurements: Time and Space complexity.

Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables, Floating-point Numbers, Converting Integers to Floating-point and vice-versa,  Mixed-mode Expressions, The type cast Operator,  The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions, Interactive Programming.

### *References*

1) A Practical Course in Spoken English by J.K.Gangal
2) Effective English Communication for you by V.Shamala
3) Developing Communication Skills by Krishna Mohan &MeeraBanerji
4) English for Competitive Exams by Bhatnagar

# SEMESTER 2 – Basics of Programming, Aptitude & Cognitive Skills – Part 1

### *Aim:*

To educate and enrich the students on quantitative ability, reasoning ability, and verbal ability.
Introduction to Programming topics like Operators, Expressions, Control Statements, Arrays, Strings And Pointers

### *Course Objectives*

To enable students to,

- Improve their quantitative ability.
- Improve the ability of arithmetic reasoning
- Enhance their verbal ability through vocabulary building and grammar
- Equip with creative thinking and problem solving skills

#### *Unit I*
Quantitative Ability – I
Problems on Trains, Time and Distance, Height and Distance, Time and Work

#### *Unit II*
Quantitative Ability – II
Problems on Ages, Alligation or Mixture, Chain Rule, Simple Interest, Simple Equation, Theory Of Equation

#### *Unit III*
Reasoning Ability – I
Analytical Reasoning, Pipes and Cistern, Logical Problems, Logical Games, Logical Deduction, Data Sufficiency, Arithmetic Reasoning

#### *Unit IV*
Verbal Ability – I
Idioms & Phrases, Synonyms, Antonyms, Classification Creativity
Ability – I
Venn Diagrams, Cube and Cuboids, Dice, Cubes and Dice, Figure Matrix

#### *Unit V*
Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators, The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break statement and continue statement.

One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers.

### References
1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun sharma

# SEMESTER 3 – Basic C Programming, Aptitude & Cognitive Skills – Part 2

### Aim
To educate and enrich the students on quantitative ability, reasoning ability and verbal ability.
Introduction to Programming topics like Structures, Unions, Functions and Recursion.

### Course Objectives
To enable students to,

- Improve their quantitative ability.
- Improve their reasoning ability.
- Enhance their verbal ability through vocabulary building and grammar
- Equip with creative thinking and problem solving skills

### Unit I
Quantitative Ability – III
Compound Interest, Profit and Loss, Partnership, Percentage, Set Theory

### Unit II
Quantitative Ability – IV
True Discount, Ratio and Proportion, Simplification, Problems On H.C.F and L.C.M

### Unit III
Reasoning Ability – II
Course of Action, Cause and Effect, Statement and Conclusion, Statement and Argument, Data Sufficiency
(DS), Statement and Assumption, Making Assumptions

### Unit IV
Verbal Ability – II
Change of Voice, Change of Speech, Letter and Symbol Series, Essential Part, Verbal Reasoning, Analyzing
Arguments
Creativity Ability – II
Seating Arrangement, Direction Sense Test, Character Puzzles, Missing Letters Puzzles, Mirror &Water
Images

### Unit V
Basics of Structures, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions, Function
Philosophy, Function Basics, Function Prototypes, and Passing Parameters: Passing Parameter by value and
Passing Parameter by reference, passing string to function, Passing array to function, Structures and
Functions Recursion.

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Introduction to Recursion, Types of Recursion - Head Recursion , Tail Recursion, Tree Recursion, Indirect Recursion and Nested Recursion . Recursion vs Looping - Analysis on efficiency of looping and recursion, Working of recursive code in main memory. Recurrence Relation , Different types of recurrence relation. Deriving time complexity and space complexity using recurrence relation.

### References

1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun sharma

# SEMESTER 4 – Advanced C Programming, Aptitude & Cognitive Skills – Part 3

## *Aim*

To educate and enrich the students on quantitative ability, reasoning ability and verbal ability. Introduction to Programming topics like Growth Functions, Recursion, Storage Classes, The Preprocessor And Dynamic Memory Allocation.

## *Course Objectives*

To enable students to,

- Enhance their quantitative ability.
- Enhance their reasoning ability
- Enhance their verbal ability.
- Equip with creative thinking and problem solving skills

### *Unit I*

Quantitative Ability – V

Square Root And Cube Root, Logarithm, Volume and Surface Area, Permutation and Combination

### *Unit II*

Quantitative Ability – VI

Probability, Averages, Area, Odd Man Out, Crypt Arithmetic, Flowcharts

### *Unit III*

Reasoning Ability – III

Data Interpretation Table Charts, Data Interpretation Bar Charts, Blood Relationship, Puzzles

### *Unit IV*

Verbal Ability – III

Spellings, Selecting Words, Spotting Errors, Ordering of Words, Logical Sequence of Words Creativity Ability – III

Logical Puzzles, Playing Cards Puzzles, Clock Puzzles, Number Puzzles, Sudoku

### *Unit V*

Polynomial Equations, Compare growth functions - order growth functions, omega growth functions, theta growth functions - Constant time, Linear time, Logarithmic time, Quadratic time and exponential time . Problems on Recursions - Factorial Number, Sum of first N Natural Numbers, Nth Fibinocci Number, Exponent Function, Taylor Series, Tower of Hanoi.

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Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables, File Inclusion, Macro Definition and Substitution, Macros with Arguments, Nesting of Macros,

Conditional Compilation, Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory, Reallocating Memory Blocks, Pointer Safety, The Concept of linked list, Inserting a node by using Recursive Programs, Sorting and Reversing a Linked List, Deleting the Specified Node in a Singly Linked List.

### References

1. Quantitative Aptitude for Competitive Exams by R. S. Agarwal
2. Quantum CAT by Sarvesh Verma
3. A Modern Approach to Logical Reasoning by R. S. Agarwal
4. Verbal Ability and Reading Comprehension by Arun Sharma

# SEMESTER 5 – Advanced C Programming, Aptitude & Cognitive Skills – Part 4

### *Aim*

To educate and enrich the students on quantitative ability, reasoning ability and verbal ability. Introduction to File Management in Programming skills**.**

### *Course Objectives*

To enable students to,

- Enhance their quantitative ability.
- Enhance their reasoning ability
- Enhance their verbal ability.
- Equip with creative thinking and problem solving skills

### *Unit I*
Creativity Ability – I
Venn Diagrams, Cube and Cuboids, Dice, Cubes and Dice, Figure Matrix

### *Unit II*
Creativity Ability – II
Seating Arrangement, Direction Sense Test, Character Puzzles, Missing Letters Puzzles, Mirror &Water Images

### *Unit III*
Creativity Ability – III

Logical Puzzles, Playing Cards Puzzles, Clock Puzzles, Number Puzzles, Sudoku

### *Unit IV*
Quantitative Ability – VII
Races And Games, Boats and Streams, Surds and Indices, Pipes and Cistern, Alligations And Mixtures

### *Unit V*
Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

**REFERENCES:**

1. Programming in ANSI C - Balagurusamy - Tata McGraw-Hill Education, 2008

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2. Programming in C (3rd Edition), by Stephen G. Kochan, Sams, 2004
3. Programming in C - Stephen G. Kochan, III Edition, Pearson Education.

# SEMESTER 6 - Advanced C Programming, Aptitude & Cognitive Skills – Part 5

### *Aim*

To educate and enrich the students on quantitative ability, reasoning ability and verbal ability. Introduction to Bit Manipulation in Programming skills**.**

### *Unit I*

Quantitative Ability – VIII
Numbers, Problems on Numbers, Pick Wrong Number, Missing Number, Areas, Shapes, Perimeter

### *Unit II*

Reasoning Ability – IV
Data Interpretation Pie Charts, Data Interpretation Line Charts, Data Sufficiency (DS), Data Arrangements, LR – Arrangements, LR – Ranking

### *Unit III*

Verbal Ability – IV
Sentence Correction, Sentence Improvement, Completing Statements, Sentence Formation, Paragraph Formation

### *Unit IV*

Creativity Ability – IV
Dot Situation, Rule Detection, Embedded Images, Grouping Of Images, Image Analysis

### *Unit V*

The hexadecimal number system, C bitwise operators, Working with individual bits, How to check if a given number is a power of 2, Count the number of ones in the binary representation of the given number, Check if the $i^{th}$ bit is set in the binary form of the given number, How to generate all the possible subsets of a set, Find the largest power of 2 (most significant bit in binary form), which is less than or equal to the given number N, Tricks with Bits, Applications of bit operations.

**REFERENCES:**

1. R. G. Dromey, "How to Solve It By Computer", Pearson, 1982
2. A.R. Bradley, "Programming for Engineers", Springer, 2011
3. Kernighan and Ritchie, "The C Programming Language", (2nd ed.) Prentice Hall, 1988