

# Maths

1. Set and set operations, Venn diagram
2. Principle of inclusion and exclusion
3. Cartesian product of sets and binary relations
4. Domain, co-domain and range of relations
5. Pictorial and matrix representation of relations
6. Equivalence relations
7. Equivalence classes, partition
8. Partial ordering relation, partially ordered set
9. Hasse diagram of posets
10. Functions-Defintions, one-to-one onto
11. Composition of Functions, inverse of a function
12. Basic Principle of Counting-Product rule, Sum rule
13. Review on Permutations and Combinations
14. Problems under Permutations and Combinations
15. Pigeon-hole principle
16. Discrete Numeric function defintion and examples, sum and product of DNFs
17. Defintion of Generating Function, examples, finding generating function for the sequence of real numbers
18. Recurrence relations - formulation of recurrence relations
19. Solution of recurrence relations using generating functions
20. Semi-groups, monoids definition and examples
21. Group defintion and examples, some basic theorems
22. Cyclic groups
23. Permutation groups
24. Axiomatic definition of Boolean Algebra and examples
25. Boolean expressions, Boolean functions
26. Propositions, conjunction and disjunction of propositions, negation of a proposition, implications,
27. converse, contrapositive and inverse of a proposition, contradiction and tautology
28. contradiction and tautology, logical equivalences
29. Predicates - ways of expressing sentences using predicates
30. Quantifiers - expressing sentences using predicates and quantifiers and quantified express into senteces
31. Graphs, digraphs, Simple graph, multi graph, pseudo graph
32. Degree of a vertex in a graph, adjacency and incidence.
33. Some basic properties, Subgraphs
34. Complete graphs, bipartite graphs
35. Graph isomorphism
36. Walk, path, cycle in a graph.
37. Eulerian and Hamiltonian walk.

# STLD

1. Number System: Binary, Decimal, Octal ,Hexadecimal
2. 1's and 2's Complements and 9's and 10's Complements
3. Binary Coded Decimal (BCD): BCD Addition and Subtraction
4. Demorgan's Theorems, Minimization of Boolean expression using algebraic method
5. Sum of Products and Product of Sums : Minterm, Maxterm
6. Karnaugh Map :
7. Quine-McCluskey or Tabular Method of Minimization of Logic Functions
8. Arithmetic Circuits: Half Adder, Full Adder
9. Half Subtractor , Full Subtractor
10. 4-bit Parallel Adder/Subtractor
11. Fast Adder
12. BCD Adder
13. Binary Multiplier
14. Combinational Circuits: Multiplexers – Basic Four input Multiplexer
15. Implementation of Boolean Expression using Multiplexers
16. Demultiplexers : 1-to-4 Demultiplexer, 1-to-8 Demultiplexer,
17. Decoders: Basic Binary Decoder, 3-to-8 Decoder
18. Encoders: Octal-to-Binary Encoder
19. Implementation of Boolean Expression using Decoders
20. Code Converters: BCD-to-Binary Converters
21. Binary-to-Gray Code Converters
22. Gray Code-to-Binary Converters
23. Flip-Flops: Latches
24. S-R Flip-Flop, D Flip-Flop
25. J-K Flip-Flop, T Flip-Flop
26. Registers: Shift Register
27. Shift Register Counters: Ring Counter
28. Johnson Counter
29. Logic families
30. Counters: Asynchronous Counter
31. Design of Synchronous Counters

# COA

1. Introduction to basic structure of computers
2. Functional units
3. Basic operational concepts
4. Bus structures, software
5. Performance
6. Numbers, Arithmetic Operations And Characters
7. Memory Locations and Addresses, Memory Operations
8. Instructions and Instruction Sequencing
9. Register Transfer Notation, Assembly Language Notation
10. Basic Instruction Types, Instruction Execution and
11. Straight-Line Sequencing
12. Branching, Condition Codes, Generating Memory Addresses methods
13. Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers
14. Indexing and Arrays, Relative Addressing
15. Additional Modes
16. Basic I/O operations, Additional Instructions
17. Addition and Subtraction of Signed Numbers
18. Design of Fast Adders
19. Carry Look Ahead Adders- Bit Stage Cell,4 Bit CLA
20. Carry Look Ahead Adders 16 Bit
21. Multiplication of Positive Numbers-Array Sequential Circuit
22. Signed Operand Multiplication-Booth Algorithm
23. Fast Multiplication-Bit Pair Recoding Of Multipliers
24. Carry-save addition of summands
25. Integer Division-Restoring & Integer Division- Nonrestoring
26. Floating Point Numbers & Operation-Standards Exceptions, check to uncheck Exception
27. Arithmetic Operations on Floating Point Numbers
28. Examples on Arithmetic Operation on Floating Point Numbers
29. Memory Systems: Basic Concepts
30. Speed, Size & Cost
31. Cache Memories- Mapping Functions
32. Replacement Algorithms
33. Example Of Mapping Techniques
34. Performance Considerations: Hit Rate & Miss Penalty, Caches on Processor Chip
35. Virtual Memories
36. Address Translation
37. Accessing I/O Devices, Interrupts
38. Interrupt H/W, Enabling Disabling Interrupts
39. Handling Multiple Devices, Controlling Device Requests, Exceptions
40. Use of interrupts in Operating Systems, Direct Memory Access
41. Flynn Classification, Multi-Core Architecture
42. Pipelining
43. Data Hazards
44. Instruction Scheduling: Static and Dynamic
45. Control Hazard
46. Branch Prediction