UNIT 1: Basic of Algorithm Analysis: Analyzing algorithms, Worst-case and average case analysis, asymptotic notations (Omega, Theta, Big "oh", Little "oh", Little Omega) recurrences: substitution method, master method.

UNIT 2: Advanced Data Structures: Hash tables, Binary trees, Binary Search trees, Binary search, Binary heaps, Heap sort and B-trees.

UNIT 3: Basic Design & Analysis Techniques: Graph algorithms like Depth First Search, Breadth First Search, and Sorting: radix sort, Quick sort, Merge sort, Finding maximum and minimum.

Advanced Design & Analysis techniques:

UNIT 4: Greedy method: Knapsack Problem, Job Sequencing with Deadline, Single Source Shortest Path, Minimum Cost Spanning Tree algorithms, Dynamic programming: 0/1 Knapsack, Multistage Graphs, Optimal Binary Search Tree

UNIT 5: Backtracking: 8 Queens Problem, Graph Coloring, Branch and bound: 4 Queens Problem, Travelling Salesperson, NP - Completeness: NP-complete and NP-complete problems

References:
1. "Fundamentals of Computer Algorithms" by Horowitz & Sahani
2. "Introduction to Algorithms" by Cormen, Leiserson & Rivest
402MCA : Systems Software

UNIT 1: INTRODUCTION: Components of System Programming, Assemblers, Loaders, Macros, Linkers, Compilers, Operating system.

UNIT 2: ASSEMBLER: design of assembler, statement of problem, data structure, format of databases, algorithms, look for modularity, review of searching and sorting techniques.

UNIT 3: MACRO: Macro instruction, features of Macro facility, Design of Microprocessor, Design of one and two pass Microprocessor and their relationship with an assembler.

UNIT 4: LOADERS & LINKERS: Loading schemes: Compile and go, General loader scheme, absolute, Subroutine relocating direct linking loader, other loader schemes, binders, linking overlays, Dynamic binders, Design of absolute loader, Design of direct linking loader.

UNIT 5: COMPILERS & INTERPRETERS: Overview of compilation process, basic compiler functions, grammar, lexical analysis, syntactic analysis etc.

References:
1. Introduction to System Software : D.M. Dhamdhere
2. System Programming - J.J. Donovan
3. System Software - Bech
403MCA JAVA PROGRAMMING

UNIT 1 - Overview of JAVA Programming
History of JAVA, features of java, how it is differ from C & C++, java program structure, java statements, JVM, command line arguments

Expression & Operator
Data types, literals, variables, declaring a variable, dynamic initialization, Arrays, Operators - relational, arithmetic, logical, assignment, increment & decrement, conditional operator, Bitwise operator, special operator, arithmetic expression, evaluation of expression

Decision making & Branching:
Control Statements--IF, Switch, Loops, Break, Continue, Return

UNIT 2 - Basic concept of OOPS:
Classes, methods, creating instance & class variable, accessing class member, Constructor, Methods overloading, Method overriding, Static member, final classes, finalizer method, Abstract method & classes, visibility control, Interfaces, Defining interfaces, extending interfaces, implementing interfaces, accessing interfaces, variables, package - system package, using system package, creating package, accessing a package, adding a class to a package, hiding classes

UNIT 3 - Exception Handling & Multithreaded Programming
Exception Handling - Fundamental, types, uncaught exception, using try and catch, multiple catch, nested try, throw, throws, finally Java thread model, creating threads, extending thread class, stopping & blocking a thread, Life cycle of thread, thread exception, thread priority, synchronization - implementing and runnable interface, inter thread communication, multithread

UNIT 4 - Developing web-based program:
What is an applet, applet architecture, applet life cycle, a simple applet program, AWT - Working with Graphics, line, rectangles, ellipses, circles, arcs, polygons Working with colors, Working with fonts, Stream and Files.

UNIT 5 - Advance Java
JDBC, JDBC architecture, JDBC Basics, establishing a connection, JDBC Statements Designing a User Interface with swing, Benefits Of swing, application framework, adding components to a swing, frame working with swing

Reference:
1. Programming with java A prelimer by “E. Balaguruswamy”.
2. “Advance programming in Java” by V.K.Jain & Hemlata
3. JAVA 2 platform in 21 DAYS by “Lemay and Cadenhead” by Techmedia pub.
4. The complete reference JAVE 2 by “Patrick Naughton & Herbert Schidt”.
404MCA: Optimization Techniques

UNIT 1 - Overview of Operation Research Problem formulation, Model Construction, O.R. Techniques. Introduction to Linear Programming Construction of the L.P. Model; Graphical L.P. Solution, Simplex method, Big m method; Primal and Dual Problems.

UNIT 2 - Replacement Problems: Capital equipment, Discounted Cost, replacement in anticipation of failure, Age replacement, Transportation and Assignment Problems.

UNIT 3 - Queuing Models: Description of Queues, Arrival and Service Times; Birth & Death queuing system, M/M/1 model.

UNIT 4 - Game Theory: Pure and Mixed strategy, two person zero sum game, game with and without saddle points, rule of dominance. Project Management Techniques; Network representation, CPM and PERT; optimization of project time and cost, crash cost and crash time.

UNIT 5 - Dynamic Programming: Deterministic and probabilistic dynamic programming, Bellman’s Principle. Integer Programming Problem; Branch and Bound techniques.

REFERENCES:
1. "Introduction to Operation Research" by F. S Hiter & Liberman
2. "Operation Research" by H.A. Tara
3. "Operation Research" by S.D. Sharma
405MCA: ACCOUNTING AND MANAGEMENT CONTROL

UNIT 1: Meaning & Objects of Accounting Concepts & Conventions, Accounting Equation, Rules Of Journalizing Cash Book, Ledger Posting, Preparation Of Trial Balance

UNIT 2: Trading And P/L Account, Balance Sheet With Adjustments Relating To Closing Stock, Out Standing Expenses, Prepaid Expenses, Accrued Income, Depreciation, Bad Debt, Provision For Bad Debt, Provision for Discount on Debtors & Creditors, Provision for Tax

UNIT 3: Inventory Pricing, FIFO & LIFO Methods, Simple Problem of Fund Flow Statements, Cost-Volume Profit Analysis

UNIT 4: Standard Costing, Computation of Material & Labor Variances, Budgetary Control, Preparation of Cash Budget & Flexible Budget

UNIT 5: Management Control & its Characteristics, Goals and its Strategies, Structure and control Responsibility Centres & Control Centres: Concept of Responsibility Centres, Revenue Center, Profit Center and Investment Center, Transfer Pricing & Responsibility Reporting.

References:

5. Welch, Hilton and Gordon (5th ed.). "Budgeting, Profit Planning and Control" Prentice Hall of India Pvt.
   Ltd. New Delhi.
6. "Introduction to Book Keeping" Grewal

501MCA: Artificial Intelligence & Expert Systems