



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, ( भारत )  
KHWAJA MOINUDDIN CHISHTI LANGUAGE UNIVERSITY, LUCKNOW, U.P., ( INDIA )  
UTTAR PRADESH STATE GOVERNMENT UNIVERSITY  
(RECOGNISED U/S 2(F) & 12(B) OF THE UGC ACT 1956 & B.TECH. APPROVED BY AICTE)

## JAVA PROGRAMMING (CS502)

**Objective:** The goal of subject is to provide the students a broad exposure to the advance object oriented programming field in order to be prepared for follow-on study.

Unit	Topic
I	Java Basics History of Java, Java buzzwords, datatypes, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.
II	<b>Packages and Interfaces :</b> Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring packages – Java.io, java.util. Exception handling and multithreading – Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.
III	<b>Event Handling :</b> Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface <b>components</b> - labels, button, canvas, scrollbars, text components, check box, check box groups, choices, <b>lists panels</b> – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grib bag.
IV	<b>Applets</b> – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. <b>Swing</b> – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, <b>buttons</b> – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.
V	<b>Networking</b> – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, Java .net package, Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Servlet, Web Server operations, general server characteristics, Security Issues, Structure of Web Application, Deploying Web Application, Introduction to Model View Controller (MVC) Architecture, its structure, components.

### References:

1. Java; the complete reference, Herbert schildt, TMH, 2011
2. Understanding OOP with Java, updated edition, T. Budd, pearson education, 2000.
3. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons, 2001.





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## THEORY OF AUTOMATA & FORMAL LANGUAGE (CS503)

**Objective:** The objective of this course is to provide basic definitions that are associated with theory of computation and to give an overview, applications, environment of computation.

Unit	Topic
I	<b>Introduction:</b> Alphabets, Strings and Languages; Automata and Grammars, Chomsky's classification. Finite Automata: Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, Myhill-Nerode Theorem.
II	<b>Regular Expression:</b> Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, <b>Regular Languages and Its Properties:</b> Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, <b>FA with output:</b> Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.
III	<b>Context free grammar (CFG) and Context Free Languages (CFL):</b> Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.
IV	<b>Push Down Automata (PDA):</b> Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.
V	<b>Turing machines (TM):</b> Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis. Recursive and Recursively Enumerable languages. <b>Undecidability:</b> Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

### References:

1. J Hopcroft, JD Ullman, R Motwani, Introduction to Automata Theory, Languages and Computation, Pearson, 2006.
2. M Sipser, Introduction to the Theory of Computation, Thomson, 2006.





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## DESIGN & ANALYSIS OF ALGORITHM (CS501)

**Objective:** To understand the importance of algorithm and its complexity of an algorithm in terms of time and space complexities.

Unit	Topic
I	<b>Introduction:</b> Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of Functions, Recurrences, Substitution method, Iteration method, Master method, Merge Sort, Quick-Sort, Heap Sort, Shell Sort, Sorting in linear time.
II	<b>Advanced Data Structures:</b> Red-black trees, Augmenting data structures, Order-statistic tree, B-Trees, Binomial heaps, Fibonacci heaps.
III	<b>Dynamic Programming:</b> Elements of dynamic programming, Assembly-line scheduling problem, Matrix chain multiplication, finding longest common subsequence, 0/1 Knapsack problem; <b>Greedy Algorithm:</b> Elements of greedy strategy, Activity selection problem, Huffman encoding, Task-scheduling problem, Knapsack problem, Amortized analysis.
IV	<b>Graph Algorithms:</b> Searching in graph, Spanning trees, Minimum cost spanning trees: Kruskal's and Prim's algorithms; Single source shortest path algorithms, Dijkstra's and Bellman Ford algorithms; All pair shortest paths algorithms, Floyd Warshal's algorithm, Network flow problem. Backtracking, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets, Branch and Bound with Examples Such as Travelling Salesman Problem.
V	<b>String Matching Algorithms:</b> Naïve string-matching algorithm, Rabin-Karp algorithm, Knuth-Morris-Pratt algorithm. Introduction of NP-completeness, Randomized algorithms and Approximation Algorithms

### References:

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein, MIT Press, 2002.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman, Pearson, 2007.
3. "Algorithm Design" by Kleinberg and Tardos, Pearson, 2005.





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## SOFTWARE ENGINEERING (CS504)

**Objective:** The course is aimed at enhancing skills that will enable the student to develop business software's that are simple reliable and capable of modification as per requirement.

Unit	Topic
I	<b>Introduction to Software Engineering</b> , Software Components, Software Characteristics, Software Crisis, Software Engineering Processes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.
II	<b>Software Requirement Specifications (SRS). Requirement Engineering Process:</b> Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Attributes, Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.
III	<b>Software Design:</b> Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.
IV	<b>Software Testing:</b> Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.
V	<b>Software Maintenance and Software Project Management, Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance:</b> Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

### References:

1. Software Engineering: A Practitioner's Approach, Pressman Roger, TMH, 2009.
2. An Integrated Approach to Software Engineering, Pankaj Jalote. Narosa Pub, 2014.
3. Software Engineering Concepts: Richard Fairly, Tata McGraw Hill, 2015.



## MICROPROCESSOR (EC501)

### UNIT I

Introduction to 8085A CPU architecture-register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin description and features

### UNIT II

Instruction cycle, machine cycle, Timing diagram.

Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).

### UNIT III

Interrupts and DMA.

Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same.

### UNIT IV

16 bit processors: 8086 and architecture, segmented memory has cycles, read/write cycle in min/max mode. Reset operation, wait state, Halt state, Hold state, Lock operation, interrupt processing. Addressing modes and their features. Software instruction set (including specific instructions like string instructions, repeat, segment override, lock prefizers and their use) and Assembly Language programming with the same

### UNIT V

Typical applications of a microprocessor.

Brief overview of some other microprocessors (eg. 6800 Microprocessor).

### Reference Books:

1. Microprocessor architecture, programming and applications with 8085/8085A, Wiley eastern Ltd, 1989 by Ramesh S. Gaonkar.
2. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter science publications, 1980.
3. An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi by Adam Osborne and J. Kane
4. Advanced Microprocessors by Ray and Bhurchandi - TMH
5. Intel Corp. Micro Controller Handbook – Intel Publications, 1994.
6. Microprocessors and Interfacing by Douglas V. Hall, McGraw Hill International Ed. 1992
7. Assembly Language Programming the IBM PC by Alan R. Miller, Subex Inc, 1987
8. The Intel Microprocessors: 8086/8088, 80186, 80286, 80386 & 80486, Bary B. Brey, Prentice Hall, India 1996





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(Recognized Under Section 2(f) & 12(B) of the U.P. Act No. 1956 & B.Tech. Approved by UAC, U.P.)

## INDUSTRIAL MANAGEMENT

### Course Objectives:

The objective of this course are

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyze and understand the environment of the organization.
- To help the students to develop cognizance of the importance of management principles.

### Course Outcomes:

- The students will be able to
- Understand the concepts related to Business.
- Demonstrate the roles, skills and functions of management.
- Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
- Understand the complexities associated with management of human

### Unit

### Topic

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| I   | Introduction: Concept, Development, application and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.   |
| II  | Management Function: Principle of Management – Time and motion study, work simplification – process charts and flow diagrams, Production Planning.   |
| III | Inventory Control: Inventory, Cost, Deterministic Models, Introduction to supply chainmanagement.  |
| IV  | Quality Control: Process control, SQC, Control charts, Single, Double and Sequential Sampling, Introduction to TQM.  |
| V   | Social Relations in Industry, Social Organization in Industry- Bureaucracy, Scientific Management and Human Relations, Early Industrialism – Types of Productive Systems – The Manorial or Feudal system The Guild system, The domestic or putting-out system, and the Factory system, Characteristics of the factory system. Causes and Consequences of industrialization. Obstacles to and Limitations of Industrialization. |





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## **DESIGN & ANALYSIS OF ALGORITHM LAB (CS551)**

### **LIST OF EXPERIMENTS**

1. Implementation of Quick Sort and Merge Sort.
2. Implementation of Linear-time Sorting Algorithms.
3. Implementation of Red-Black Tree operations.
4. Implementation of Binomial Heap operations.
5. Implementation of an application of Dynamic Programming.
6. Implementation of an application of Greedy Algorithm.
7. Implementation of Minimum Spanning Tree Algorithm.
8. Implementation of Single-pair shortest path Algorithm.
9. Implementation of All-pair shortest path Algorithm.
10. Implementation of String Matching Algorithm.





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## **JAVA PROGRAMMING LAB**

### **(CS552)**

### **LIST OF EXPERIMENTS**

1. Write a program to display the default value of all primitive data types in Java.
2. Write a Java program to sort given list of numbers.
3. Write a Java program to implement linear search.
4. Write a Java program to implement binary search.
5. Write a java program to add two given matrices.
6. Write a java program to multiply two given matrices.
7. Write a java program for sorting a given list of names.
8. Write a java program that checks whether a given string is a palindrome or not.
9. Write a java program that performs call by value and call by reference.
10. Write a java program that illustrates the simple inheritance.
11. Write a java program that illustrates the multilevel inheritance.
12. Write a java program that demonstrates the difference between method overloading and overriding.
13. Write a java program that demonstrates the difference between method overloading and constructor overloading.
14. Write a java program that describes the exception handling mechanism.
15. Write a java program that uses try & catch blocks and check whether the given array size is negative or not.
16. Write a java program that describes the user defined exception.
17. Write a java program that illustrates the creation of threads by using runnable class.
18. Write a java program that illustrates the multiple inheritances by using interfaces.
19. Write a java program to create a package named p1, and implement this package in ex1 class.
20. Write a java program to create a package named my pack, and import it in circle class.
21. Write a java program that illustrates the example for abstract class.
22. Write a java program that describes the life cycle of an applet. - A java program to Create a dialog box and menu. - A java program to create a grid layout control.
23. A java program to create a border layout control.
24. Write an Applet that creates a simple calculator.





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## **SOFTWARE ENGINEERING LAB (CS553)**

### **LIST OF EXPERIMENTS**

1. Introduction to Microsoft Project Professional.
2. Basic steps required to create project and prepare it for data entry (project tasks, sequence the tasks and estimate task duration).
3. Setting up a project [Eating Breakfast] and establish the basic constraints that project will use for its calculation. Analyze the project from different view [Gantt Chart, Network Diagram]
4. Setting up a project [Refurbishment of Workshop] and identifying relationship among the different task and subtask.
5. Setting up a project [Exam Cell Activities] and explain how to enter resources and specific information in Microsoft Project and resources to specific tasks.
6. Case Study: Project Windows 8 (Module works on windows Vista and now transform the module to work on Window 8).