राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर
NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme (Second Year)

Third Semester

S. No.	Course Title	Course Name	L	T	P	Credits
1.	Program Core (CS103101CS)	Digital Logic & Design	3	1	0	4
2.	Program Core (CS103102CS)	Discrete Mathematics	3	1	0	4
3.	Program Core (CS103103CS)	Object Oriented Programming using JAVA	3	1	0	4
4.	Program Core (CS103104CS)	Theory of Computation	3	1	0	4
5.	Program Core (CS103105CS)	Operating System	3	1	0	4
6.	Mathematics Course (CS103001MA)	Mathematics III	3	1	0	4
7.	Laboratory (CS103401CS)	Object Oriented Programming using JAVA Lab	0	0	2	1
8.	Laboratory (CS103402CS)	Operating System Lab	0	0	2	1
	Total Credits		**18**	**6**	**4**	**26**

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Departmental of Computer Science & Engineering
Syllabus
B.Tech. III Semester (Computer Sc. & Engineering)

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Digital Logic & Design (DLD)
3.	L-T-P Structure	3-1-0
4.	Credits / # of period	4
5.	Course number(Code)	CCS31
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	NIL
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. This course aims to provide the basic concepts of number system, combinational and sequential circuits and its ability to understand the relevance of digital logic and design.	
10.	Course Syllabus: **Unit –I: Number System and Boolean Algebra** Basic Gates, Universal gates, Realization of switching functions, Binary Number, Number System, Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Binary Codes, Binary Arithmetic. Logic Operations, Demorgan's Theorem, Laws of Boolean Algebra, Boolean Functions, Duality, Complement, Integrated Circuits. **Unit –II: Minimization of Switching Function** Canonical Forms, Standard Forms, Karnaugh's Map Method (limited up to 4-variables), Sum of product and Product of Sum Simplification, Quine McCluskey's Method, Cases with Don't care conditions and multiple output switching functions. **Unit –III: Combinational Circuits** Half/full Adder, Half/full subtractors, Binary Parallel Adder, Look ahead carry generators, Decoders and encoders, BCD to 7 segment decoders, Multiplexers and Demultiplexers, Modular Design using IC chips, Parity bit generator and detector, Error detection, Programmable Logic Devices, ROM and PLA. **Unit –IV: Sequential Circuits** Introduction to registers and counters: Flip-Flops and their conversion, Excitation Tables, Synchronous and Asynchronous Counters and Designing of sequential circuits: code converter and counters. Mode-K and divide by K counters, Counter Applications, Shift Registers.	

11.	Text Books:- 1. Digital logic and computer design- M.M. Mano, PHI. 2. Modern Digital electronics- R.P. Jain, TMH.
12.	Reference Books :- 1. Pulse, Digital and Switching Waveforms -Millman Taub, TMH. 2. Digital fundamentals - Floyd, UBS. 3. Digital electronics & Logic Design - B. Somanathan Nair, Prentice-Hall of India.

Dr. N. K.Nagwani
Member

Dr. D.S. Sisodia
Member

Dr. Mithilesh Atulkar
External Member

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Departmental of Computer Science & Engineering
Syllabus
B.Tech. III Semester (Computer Sc. & Engineering)

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Discrete Mathematics
3.	L-T-P Structure	3-1-0
4.	Credits / # of period	4
5.	Course number(Code)	CCS32
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	NIL
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. Understand the concepts of logic, functions, relations and the methods of proof. 2. Build mathematical models to solve the real world problems using appropriate methods of discrete logics.	
10.	Course Syllabus: **Unit –I: Mathematical Logic & the Properties of Integers** Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems. Properties of the Integers: The well – ordering principle, Recursive definitions. **Unit –II: Functions, Relations and Group** Function, Properties of function, composition of function, Recursive functions, Relations, Properties of relation, Partial order and total order relations, Group, semi groups, Permutation Group, Cyclic group, Sub- group, Cosets, Langranges theorem, Some theorem, on subgroups, Homomorphism and isomorphism of group, Normal sub group, Quotient group, Pigeon-hole principle, Generating function, The principle of inclusion and exclusion, Dearrangments, The rook polynomials. **Unit –III: Ring, Field and Element of Coding Theory** Ring - Definition and examples, subring, integral domains, field – Definition and examples, Elements of coding theory, parity check code, Binary Symmetric channel, Hamming Weight and Distance, Group codes, Parity check and Generator Matrix, Decoding, Hamming Matrices, Coset Decoding, Hamming Codes.	

	Unit –IV: Graph and Lattice Theory Introduction to graph theory, Walks, Paths & Circuits, Types of graphs, Shortest path problems, Eulerian and Hamiltonian graphs, Basic concept of tree - spanning tree, minimal spanning tree, search tree, rooted binary tree, Cut sets, Network flow, Matrix representation of graph, Partially ordered set, Lattice, Lattice as Algebraic system, Sub lattices , Some Special Lattices.
11.	Text Books:- 1. Elements of discrete mathematics-A computer oriented approach by C.L. Liu and D P Mohapatra, Tata McGraw-Hill publications. 2. Discrete Mathematical structures -Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, Pearson/PHI Education. 3. Discrete and Combinatorial Mathematics -Ralph P. Grimaldi, Pearson Education.
12.	Reference Books :- 1. A Text Book of Discrete Mathematics -Swapan Kumar Sarkar, S Chand & Company Ltd. 2. Graph theory with applications to engineering and computer science, -Narsingh Deo, Prentice Hall of India. 3. Discrete mathematics for computer scientists and mathematicians, -J.L. Mott, A. Kandel and T.P. Baker, Prentice Hall of India. 4. Discrete Mathematical Structures with applications to computer science, -J.P. Tremblay and R. Manohar, Tata McGraw-Hill.

Dr. N. K.Nagwani
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Dr. D.S. Sisodia
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Dr. Mithilesh Atulkar
External Member

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Departmental of Computer Science & Engineering
Syllabus
B.Tech. III Semester (Computer Sc. & Engineering)

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Object Oriented Programming Using JAVA
3.	L-T-P Structure	3-1-0
4.	Credits / # of period	4
5.	Course number(Code)	CCS33
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	Computer Programming
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. Be able to use the Java SDK environment to create, debug and run simple Java programs. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. To develop the ability to write computer programs to solve specified problems like develop GUI programs, design Applets for web applications.	
10.	Course Syllabus: **Unit -I: Introduction to Java** Overview and characteristics of Java, Java Programming Environment, Fundamental Programming, Java program Compilation and Execution, Arrays, String and StringBuffer Classes, Inheritance: Definition, types of Inheritance, Super Keyword, Method Overriding, Using Abstract Class and Final with Inheritance, The Object Class, Interface, Packages. Exception Handling: Fundamentals, Exception Types, Un Caught Exceptions, Using Try and Catch, Multiple catch Clauses, throw, throws, finally, Java Built-in Exceptions. **Unit -II: Multithreaded Programming** The Java Thread Model, thread Properties, The Main Thread, Life cycle of Thread, Creating Thread, creating Multiple Threads, using isAlive and join method, suspending, resuming and stopping threads. Enumerations, Auto boxing and Annotations (Metadata): Enumerations, Type Wrappers, Auto boxing, Annotations.	

	Unit -III: Applets and Swing Applet design, AWT packages, Applet event handling, parameters to applets, Introduction to swings, Swing Components, Event Handling: Event Handling Mechanisms, The Delegation Event Model: Events, Event Sources, Event Listeners, Event Classes, And Event Listener Interfaces. **Unit -IV: Input/Output** The Java I/O Classes and Interfaces, the Stream Classes. The Byte Streams: InputStream, OutputStream, FileInputStream, FileOutputStream, PrintStream, DataInputStream, DataOutputStream. The Character Streams: Reader, Writer, FileReader, FileWriter, CharArrayReader, CharArrayWriter, BufferedReader, BufferWriter, The Collections Framework: Collections Overview, the Collection Interfaces, the Collection Classes.
11.	Text Books:- 1. Java complete reference – Herbert Schildt, McGraw-Hill Education. 2. Java: How to Program- Paul Deitel, Harvey Deitel, Prentice Hall.
12.	Reference Books :- 1. Programming with Java - John Hubbard, Schaum's series. 2. Java Examples in a nutshell – David Flanagan, O'Reilly Media. 3. Core Java – Cay S. Horstman, Gary Cornell, Pearson Education.

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Departmental of Computer Science & Engineering
Syllabus
B.Tech. III Semester (Computer Sc. & Engineering)

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Theory of Computation
3.	L-T-P Structure	3-1-0
4.	Credits / # of period	4
5.	Course number(Code)	CCS34
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	Discrete Mathematics
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. To introduce concepts in automata theory and theory of computation. 2. To identify different formal language classes and their relationships. 3. To design grammars and recognizers for different formal languages.	
10.	Course Syllabus: **Unit-I: The Finite Automata** Introduction to automata theory, Examples of Automata, Chomsky hierarchy, Finite Automata (FA) as a language acceptor and translator. Deterministic finite automata, Non deterministic finite automata, finite automata with output (Mealy Machine. Moore machine). Finite automata with Epsilon moves, Conversion of NFA to DFA by Arden's Method, Minimization of DFA. Properties and limitation of FSM. Equivalence of FA, Application of FA. **Unit-II: Regular Expressions** Regular expression, Operators & Algebraic Laws of Regular Expression. Conversion of DFA to Regular Expression, Conversion of Regular Expression to DFA. Pumping lemma for Regular sets. Application of pumping lemma, Regular sets and Regular grammar. **Unit-III: Context Free Grammars and Push Down Automata** Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types of grammars. Role and application areas of grammars. Context free grammar and Context sensitive grammar. Left most & right most derivation trees. Ambiguity in grammar. Chomsky Normal From (CNF). Greibach Normal Form (GNF), Pumping lemma from context free language, CYK Algorithm. Basic definitions. Deterministic push down automata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language.	

	Unit-IV: Turing Machine and Computability Turing machine model. Representation of Turing Machine Construction of Turing Machine for simple problem's. Universal Turing machine and other modifications, Un-decidability problem of TM, Halting problem of Turing Machine. Introduction and Basic concepts. Recursive function, Initial functions, computability. Space and time complexity. Church's Hypothesis. Post correspondence problem.
11.	Text Books:- 1. Introduction to Automata theory. Language and Computation -John E. Hopcropt & Jeffery D. Ullman, Narosa Publishing House. 2. Theory of Computer Science (Automata Language & Computation) -K.L.P. Mishra and N. Chandrasekran, PHI. 3. Introduction to Languages and the Theory of Computation. Martin, John C.
12.	Reference Books :- 1. Theory of Automata and Formal Language -R.B. Patel & P. Nath, Umesh Publication. 2. An Introduction and finite automata theory -Adesh K. Pandey, TMH. 3. Theory of Computation -AM Natrajan. Tamilarasi, Bilasubramani, New Age International Publishers.

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External Member

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Convener

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Chairperson , DAC

Operating System

[3rd Semester, Second Year]

Course Description

Offered by Department	Credits	Status	Code
Operating System	3-1-0, (4)	EPR	CS103105CS

[Pre-requisites:

1. Fundamentals of Computer architectures
2. Programming languages Such as C/C++/JAVA, etc.
3. Data Structures]

Course Objectives

1. To understand (functions, structures, and history) of modern of operating systems.
2. To learn various process management concepts including scheduling, synchronization, deadlocks, multithreading, etc.
3. To learn concepts of memory management including virtual memory.
4. To learn issues related to file system interface and disk management.
5. To study with various types of Modern operating systems.

Course Content

Unit-1 Introduction of OS and Process:

Introduction of OS: Functions and services of OS, Types of OS, Architectures of OS etc. Process concept: Introduction of Process, process Control Block, Process States, and Transitions, Operations on Processes, advantages, comparison with program, Threads, multithreading, user level threads, kernel level threads, advantages, comparison with process. Process scheduling: concepts, types of schedulers, scheduling criteria, and scheduling Algorithms, Algorithm evaluation.

Unit-2 Processes Synchronization and Deadlocks:

Mutual Exclusion, the critical section problem, Software and Hardware solutions for mutual exclusion, semaphores, Classical problems in concurrency, Deadlock-System model, Deadlock characterization, Deadlock handling methods- Prevention, Avoidance and Detection, Recovery from deadlock.

Unit-3 Memory Management:

Base machine, resident Monitor, multiprogramming with fixed partition, Multiprogramming with variable Partitions, Paging, Segmentation, paged segmentation, Virtual Memory concepts, Demand paging, performance, page Replacement algorithms, Allocation of frames, Thrashing, cache memory organization impact on performance.

Unit-4 Disk and File Management:

File system: File Concepts, attributes, operations, File organization and Access mechanism, File sharing, Implementation issues. Disk I/O, Disk Scheduling Algorithms, disk space allocation methods, Directory structure, free disk space management, Case studies: UNIX, Windows, Android etc. operating systems.

Course Materials

Required Text: Text books

1. Operating System concepts, Silberscatz A and Peterson, Peter B. Galvin , J.L, PE-LPE

Optional Materials: Reference Books

1. Operating System Design & Implementation, Tanenbaum, A.S., PHI.
2. Operating systems H.M. Deital Pearson Education
3. Operating System Concept & Design, Milenkovic M, McGraw Hill.
4. Operation System, Stalling William, Maxwell MCMillan International Editions.

DEPARTMENT OF MATHEMATICS
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B. Tech 3rd Semester (Computer Science & Engg.)

1.	**Department proposing the course**	Department of Mathematics
2.	**Course Title**	Mathematics-III
3.	**L-T-P Structure**	3-1-0
4.	**Credits / # of period**	4/40
5.	**Course number(Code)**	CMA31(CS)
6.	**Status (Core/Elective)**	Core
7.	**Pre-requisites (course no./title)**	Mathematics-I, Mathematics-II
8.	**Frequency of offer**	Regular
9.	**Course Objectives(CO) :** To enable the students to apply the knowledge of Mathematics in various fields: 1. Introduce Fourier Series and Fourier Transform. 2. Introduce the concepts of Laplace Transform and its application in solution of differential equations and improper integral. 3. Able to form and solve the partial differential equation using different analytical techniques with application in finding the solution of wave, heat and Laplace equations. 4. Introduce to Complex analysis with application in solution of Improper Integral.	
10.	**Course Syllabus:** **Unit-1: FOURIER SERIES AND FOURIER TRANSFORM** Expansion of function as Fourier series, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half-range series, Harmonic analysis, Fourier Transformation, Inverse transformation, Finite cosine and sine transform. **Unit-2: LAPLACE TRANSFORM** Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives and integrals, Multiplication by t^n , Division by t, Evaluation of Integrals, Periodic functions, Inverse Laplace transform, Convolution theorem, Application of Laplace transform to find the solutions of ordinary differential equations. **Unit-3: PARTIAL DIFFERENTIAL EQUATION** Formation, Solutions by direct integration method, Linear equations of first order, Homogeneous linear equations with constant coefficients, Non-homogeneous linear equations, Method of separation of variables with application in solution of wave, heat and Laplace equations.	

	Unit-4: COMPLEX ANALYSIS Complex number, Complex functions, Limit and Continuity, Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, application to flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Cauchy-Residue Theorem, Application in Evaluation of real definite integrals.

11.	**Text Books:-** 1. Higher Engineering Mathematics by B. S. Grewal - Khanna Publishers. 2. Advanced Engineering Mathematics by Erwin Kreyszig - John Wiley & Sons.
12.	**Reference Books :-** 1. Advanced Engg. Mathematics by R. K. Jain and S. R. K. Iyengar–Narosa Publishing House. 2. Higher Engineering Mathematics by B. V. Ramana, McGraw Hill

Dr. S. K. Samanta
(Member, DAC)

Dr. D. Mishra
(Member, DAC)

Dr. S. N. Raw
(Member, DAC)

Dr. A. Khare
(External Member, DAC)

Dr. D. Sharma
(Convener, DAC)

Dr. G. P. Singh
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Professor
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Dr. A. K. Sinha
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25/01/19.

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Departmental of Computer Science & Engineering
Syllabus
B.Tech. III Semester (Computer Sc. & Engineering)

1.	Department proposing the course	Computer Science & Engineering
2.	Course Title	Object Oriented Programming Using JAVA (Lab)
3.	L-T-P Structure	0-0-2
4.	Credits / # of period	1
5.	Course number(Code)	
6.	Status (Core/Elective)	Core
7.	Pre-requisites (course no./title)	Computer Programming
8.	Frequency of offer	Once in a Year
9.	Course Objectives(CO) : 1. Be able to use the Java SDK environment to create, debug and run simple Java programs. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. To develop the ability to write computer programs to solve specified problems like develop GUI programs, design Applets for web applications.	
10.	Course Syllabus: 1. Write a Java program based on Decision making, branching and looping. 2. Write a Java program to perform String Operation. 3. Write a Java program to demonstrate Interfaces. 4. Write a java program to demonstrate Packages. 5. Write a java program to demonstrate Exception using try and multiple catch blocks. 6. Write a Java Program Method Overloading, Constructor and Constructor overloading. 7. Write a Java program to demonstrate Inheritance. 8. Write a java program to demonstrate Multithreading. 9. Write a java program to demonstrate Swings components. 10. Write a Java program to demonstrate AWT packages. 11. Develop an applet that displays a simple message. 12. Write a Java program to demonstrate Applet event handling. 13. Write a Java program based on I/O Handling.	

11.	Text Books:- 1. Java complete reference – Herbert Schildt, McGraw-Hill Education. 2. Java: How to Program- Paul Deitel, Harvey Deitel, Prentice Hall.
12.	Reference Books :- 1. Programming with Java - John Hubbard, Schaum's series. 2. Java Examples in a nutshell – David Flanagan, O'Reilly Media. 3. Core Java – Cay S. Horstman, Gary Cornell, Pearson Education.

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Chairperson , DAC

Operating System (Lab)

[3rd Semester, Second Year]

Course Description

Offered by Department	Credits	Status	Code
Operating System (Lab)	0-0-2, (1)	EPR	CS103402CS

[Pre-requisites:

1. Fundamentals of Computers & architectures
2. Programming languages Such as C/C++/JAVA, etc.
3. Data Structures]

Course Objectives

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies

Course Content

1. Working with Different Operating Systems a. Study the DOS environment and practice commands for various activities like , File Handling, Text Processing, System Administration, Process Management, Archival, Network, File Systems, Advanced Commands
2. Work with some configuration commands & create batch files in the DOS environment.
3. Install and configure Linux and work with Linux commands for the activities given in experiment 1.
4. Write a program for the implementation of various CPU scheduling algorithms (FCFS, SJF, Priority).
5. Write a program for the implementation of various page replacement algorithms (FIFO , Optimal, LRU).
6. Write a program for the implementation of system calls (Fork and V-fork) of Unix operating systems.
7. Write a program for the implementation of the Producer-Consumer problem.
8. Write a program for the implementation of Readers Writers problem.
9. Write a program for the implementation of Banker's algorithm.
10. Write a program to simulate the concept of semaphores.
11. Write a program to simulate the concept of inter process communication.
12. Write a program for the implementation of various memory allocation algorithms (First fit, Best fit, and Worst fit).
13. Write a program for the implementation of various Disk scheduling algorithms (FCFS, SCAN, SSTF, C-SCAN).

Course Materials

Required Text: Text books

1. An Introduction to Operating Systems, P.C.P Bhatt, 2nd edition, PHI.

Optional Materials: Reference Books

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI