List of Revised Courses

Department : *Information Technology Engineering*

Program Name : *B.Tech.*

Academic Year : 2021-22

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	IT203TPC01	DATA STRUCTURE AND ALGORITHMS
02.	IT203TBS05	MATHEMATICS-III
03.	IT204TPC01	DISCRETE MATHEMATICS
04.	IT204TPC02	COMPUTER ORGANISATION & ARCHITECTURE
05.	IT204TPC03	OPERATING SYSTEMS
06.	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2016-17

School : *School of Studies of Engineering and Technology*

Department : *Information Technology Engineering*

Date and Time : *September 01, 2021 – 04:00 PM*

Venue : *Department of Information Technology*

Minutes of Meeting

Minutes of Meeting Dated 01/09/2021

A Meeting of BoS in Information Technology was held today on 01/09/2021 at 04.00 PM. The Following Members have attended the meeting.

1. Dr. Rohit Raja, BoS Chairman, Dept. of Information Technology, SoS-E&T, GGV.
2. Prof. Sunita Agrawal, Professor, MNIT Allabhabad
3. Mr. Ashish Shrivastava, SDO, BSNL, Bilaspur
4. Mr. Agnivesh Pandey, Member, BoS, Dept. of IT, SoS-E&T, GGV
5. Dr. Amit Kumar Khaskalam, Invited Member
6. Dr. Rajesh Mahule, Invited Member
7. Dr. Santosh Soni, Invited Member
8. Mr. Abhishek Jain, Invited Member
9. Mr. Pankaj Chandra, Invited Member
10. Mr. Deepak Kant Netam, Invited Member
11. Mr. Suhel Ahamed, Invited Member
12. Mr. Amit Kumar Dewangan, Invited Member.
13. Mrs. Aradhana Soni, Invited Member.

The Head of Department welcomed all members of BoS in the meeting and then the following agenda was discussed in the meeting.

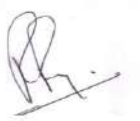
1. The Scheme and Syllabus of B.Tech. IT – 2nd Year 2021-22 (3rd and 4th Semester) CBCS has been discussed and approved.

The committee discussed and approved the scheme and syllabi. The following courses were revised in the B. Tech. Second year (III and IV Semesters):

- MATHEMATICS-III (IT203TBS05)
- DATA STRUCTURE AND ALGORITHMS (IT203TPC01)
- DISCRETE MATHEMATICS (IT204TPC01)
- OPERATING SYSTEMS (IT204TPC03)
- COMPUTER ORGANISATION & ARCHITECTURE (IT204TPC02)
- DESIGN & ANALYSIS OF ALGORITHMS (IT204TPC04)

The following new courses were introduced in the B. Tech. Second year (III and IV Semesters):

- DIGITAL ELECTRONICS (IT203TPC02)
- OBJECT ORIENTED PROGRAMMING (IT203TPC03)
- ANALOG ELECTRONICS CIRCUITS (IT203TPC01)
- OBJECT ORIENTED PROGRAMMING LAB (IT203PPC03)
- ANALOG ELECTRONIC CIRCUITS LAB (IT203PES06)
- DIGITAL ELECTRONICS LAB (IT203PPC02)
- DATA STRUCTURE LAB (IT203PPC01)
- MANAGEMENT-I (IT204TPC03)
- OPERATING SYSTEM LAB (IT204THS02)
- COMPUTER ORGANISATION & ARCHITECTURE LAB (IT204PPC01)
- IT WORKSHOP (IT204PPC03)



HEAD

Scheme and Syllabus

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER IV
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT204TPC01	DISCRETE MATHEMATICS	3	1	0	30	70	100	4
2	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE	3	0	0	30	70	100	3
3	IT204TPC03	OPERATING SYSTEMS	3	0	0	30	70	100	3
4	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS	3	0	0	30	70	100	3
5	IT204THS02	MANAGEMENT I – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
PRACTICAL									
1	IT204PPC01	COMPUTER ORGANIZATION & ARCHITECTURE LAB	0	0	4	30	20	50	2
2	IT204PPC02	OPERATING SYSTEMS LAB	0	0	4	30	20	50	2
3	IT204PPC03	IT WORKSHOP	1	0	2	30	20	50	2
TOTAL CREDITS									22
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER III
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT203TES06	ANALOG ELECTRONIC CIRCUITS	3	0	0	30	70	100	3
2	IT203TPC01	DATA STRUCTURE & ALGORITHMS	3	0	0	30	70	100	3
3	IT203TPC02	DIGITAL ELECTRONICS	3	0	0	30	70	100	3
4	IT203TBS05	MATHEMATICS-III	3	1	0	30	70	100	4
5	IT203TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
PRACTICAL									
1	IT203PES06	ANALOG ELECTRONIC CIRCUITS LAB	0	0	4	30	20	50	2
2	IT203PPC01	DATA STRUCTURE LAB	0	0	4	30	20	50	2
3	IT203PPC02	DIGITAL ELECTRONICS LAB	0	0	4	30	20	50	2
4	IT203PPC03	OBJECT ORIENTED PROGRAMMING LAB		0	4	30	20	50	2
TOTAL CREDITS									25
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT203TPC01	3	0	4	3 HOURS	30	70	3

DATA STURCTURE & ALGORITHMS

Course Objective

- CO1 - To impart the basic concepts of data structures and algorithms and understand concepts about searching and sorting techniques.
- CO2 - To understand basic concepts about Linked lists and master the implementation of linked data structures.
- CO3 - To understand basic concepts about stacks and queues.
- CO4 - To understand basic concepts about Tree.
- CO5 - To understand basic concepts about Graph and be familiar with some graph algorithms such as shortest path and minimum spanning tree.

Course Outcome

Upon completion of this course, the students will be able to

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT- I

Introduction: Basic Terminology, Definition of Data Structure, Types of Data Structure, Operation on Data Structure, **Arrays:** Array Definition, Representation of Arrays: Row Major Order, and Column Major Order.

Searching and Sorting: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Binary Search, Linear Search.

UNIT II

Linked lists: Definition, Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly Linked List, Circularly Linked List.

UNIT III

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.,

Queue: Array and linked representation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Deques.

UNIT IV

Trees: Basic Technology , Binary Tree , Binary tree representation , Algebraic Expressions , Complete Binary Tree, Extended Binary Tree, Full Binary Tree, Array and linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary search trees (BST), Insertion and deletion in BST, AVL trees, Heap and heap sort.

UNIT V

Graph: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Weighted Graph, Sequential Representations of Graphs, Adjacency Matrices, Adjacency List, Path Matrices, Linked Representations of Graphs, Graph Traversal - DFS, BFS, Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm.

References books:

1. Lipschutz, "Data Structures with C" Schaum's Outline Series, TMH.
2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd.
3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia.
4. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd.
5. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
6. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
7. G A V Pai, "Data Structures and Algorithms", TMH.
8. G.S.Baluja, "Data Structures through C", Dhanpat Rai & Co.
9. Yashavant Kanetkar, "Data Structure Through C", BPB Publication.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TBS05	3	1	0	4 HOURS	30	70	4

Course Objective

1. To provide knowledge of various methods for numerical solutions of algebraic and transcendental equations, simultaneous equation and ordinary differential equations.

2. To provide a thorough understanding of interpolation and numerical differentiation and integration.

Mathematics - III

UNIT- I Introduction of Errors and their Analysis, types of errors, numerical problems on error ana lysis, curve fitting: method of least squares, fitting of exponential curves $y = ae^{bx}$ fitting of the curve $y = ab^x$, fitting of the curve $y = ax^b$. Method or moments

UNIT- II Numerical Solution of Algebraic and Transcendental Equations: Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method. Iterative methods. Jacobi Iterative Method. Gauss Seidel Iterative method.

UNIT- III The Calculus of Finite Differences: Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.

UNIT- IV Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation form ul a. Maxirnn and Minima of aTabulated function, Numerical Integration :-Trapezoidal rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule.
Difference Equations: Definition, order and degree of a difference equation, Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients.

UNIT- V Numerical solution of ordinary differential equation: Taylor series meth od, Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation. Laplace equation and Poisson equation.

Text Books:

1. JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.
2. RAO G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.

Reference Books:

5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S.S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.
8. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT204TPC01	3	1	0	4 HOURS	30	70	4

Course Objective

1. To introduce a number of discrete mathematical structures found to be serving as tools in the development of theoretical computer science.
2. Course focuses on how discrete structures actually helped computer engineers to solve problems occurred in the development of programming languages.
3. Course highlights the importance of discrete structures towards simulation of a problem in computer science engineering.

Discrete Mathematics

Unit 1:

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Bijective functions, Inverse and Compo site Function, Size of a Set, Finite and infinite Set s. Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Unit 2:

Basic counting technique s-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well -Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental
Theorem of Arithmetic.

Unit 3:

Propositional Logic: Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.

Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

Unit 4:

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, **Monoids, Groups, Congruence** Relation and Quotient Structures, Free and Cyclic Monoids and Groups, **Permutation Groups, Substructures,** Normal Subgroups, Algebraic Structures with two Binary Operation, **Rings, Integral Domain and** Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, **Duality, Representation** of Boolean Function, Disjunctive and Conjunctive Normal Form

Unit 5:

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, **Isomorphism, Eulerian and** Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, **Four colour conjecture, trees** and rooted trees, binary trees.

Text books:

1. **Kenneth H. Rosen,** Discrete Mathematics and its Applications, Tata McGraw - Hill
2. **Susanna S. Epp, Discrete** Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. **C L Liu and D P Mahapatra,** Elements of Discrete Mathematics A Comput er Oriented App roach, 3rd **Edition by, Tata McGraw - Hill.**

Aradhana Soni

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC02	3	0	0	3 hours	30	70	3

COMPUTER ORGANIZATION & ARCHITECTURE

Course Objectives:

CO1: Conceptualize the basics of organizational and architectural,
CO2: Learn about various basic arithmetic operation
CO3: Learn about various control unit design and Input-output subsystems
CO4: Understand the basics pipeline.
CO5: Understand the basics Memory organization and their basic working.

UNIT 1

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

UNIT 2

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

UNIT 3

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

UNIT 4

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

UNIT 5

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Suggested books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Suggested reference books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course Outcomes:

After the course the students are expected to be able to

1: Demonstrate computer organization and architecture concepts of a computer system
2: Describe the Computer arithmetic operation algorithm and hardware
3: Understand the basics of hardwired and micro-programmed control of the CPU, Memory, I/O system
4: Describe fundamentals concepts of pipeline and issues
5: Describe the memory hierarchy and related function,

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SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC03	3	0	4	3 hours	30	70	3

OPERATING SYSTEMS

Objectives of the course

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

UNIT I - INTRODUCTION TO OPERATING SYSTEM:

Objective and function of operating system. The evaluation of the operating system, system components operating system services, system structure, batch interactive, time sharing and real time operating system, Protection. File system: File concepts, file organization and access mechanism.

UNIT II - CONCURRENT PROCESS:

Process concepts, principal of concurrency. The producer consumer problem, the critical section problem , semaphore, classical problem in concurrency , inter process communication , process generation , process scheduling .

UNIT III - CPU SCHEDULING:

Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.

UNIT IV - DEAD LOCKS:

System models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.

UNIT V - MEMORY MANAGEMENT:

Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register, paging, segmentation, paging segmentation, virtual memory concepts , demand paging performance , page replacement algorithms, allocation of frames, thrashing , cache memory organization impact on performance .

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SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC04	3	0	0	3 hours	30	70	3

DESIGN & ANALYSIS OF ALGORITHMS

Course Objectives

1. To develop proficiency in problem solving and programming.
2. To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
3. To get a good understanding of applications of Data Structures.
4. To develop a base for advanced study in Computer Science.
5. To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Unit 1:
Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit 2:
Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branchand-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Unit 3:
Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit 4:
Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit 5:
Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Suggested books:
1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.