Proposed Scheme for Second Year Undergraduate Program in IOT and Cyber Security with Block Chain Technology: Semester III (Autonomous)

(Academic Year 2022-2023)

Sr	Course Code	Course	Teaching Scheme (hr)			Continuous Assessment (A)			Semester End Examination (B)			Aggregate (A + B)
			T	P/Tut	Credit	Th.	T/W	Total CA (A)	Th	O & P	Total SEA (B)	
1	DJ19ICC301	Engineering Mathematics - III	4		4	25	--	25	75	--	75	**100**
	DJ19ICT301	Engineering Mathematics – III Lab		1	1	--	25	25	--	--	--	**25**
2	DJ19ICC302	Data Structures	3		3	25	--	25	75	--	75	**100**
	DJ19ICL302	Data Structures Lab		2	1	--	25	25	--	25	25	**50**
3	DJ19ICC303	Database Management Systems	3		3	25	--	25	75	--	75	**100**
	DJ19ICL303	Database Management Systems Lab		2	1	--	25	25	--	25	25	**50**
4	DJ19ICC304	Discrete Structures	3		3	25	--	25	75	--	75	**100**
	DJ19ICL304	Discrete Structures Tutorial		1	1	--	25	25	--	--	--	**25**
5	DJ19ICC305	Digital Logic Design and Applications	3		3	25	--	25	75	--	75	**100**
	DJ19ICL305	Digital Logic Design and Applications Lab		2	1	--	25	25	--	--	--	**25**
6	DJ19ICL306	Programming Laboratory I (Python)	-	2	1	--	25	25	--	25	25	**50**
7	DJ19A2	Innovative Product Development-I	-	2	1	--	--	--	--	--	--	--
8	DJ19A3	Constitution of India	1	-	-	--	--	--	--	--	--	--
		Total				125	150	275	375	75	450	675

Th	Theory	**T/W**	Termwork
P	Practical	**O**	Oral
T	Tuturial		

Prepared by Checked by Head of Department Vice Principal Principal

Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (hrs.)
Theory	One Term test (based on 40 % syllabus)	25 each (Avg.25)	1
	Second Term test (next 40 % syllabus) / presentation / assignment / course project / group discussion / any other.		as applicable
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	--	
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	25	
Laboratory &Tutorial	Performance in the laboratory and tutorial.	25	

The final certification and acceptance of term work will be subject to satisfactory performance upon fulfilling minimum passing criteria in the term work / completion of audit course.

Semester End Assessment (B):

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	75	3
	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	25	as applicable
Practical	Performance of the practical assigned during the examination and the output / results obtained.	25	2
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	as per the scheme	2

Prepared by Checked by Department Coordinator Principal

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Engineering Mathematics - III (DJ19ICC301)		
Course: Engineering Mathematics - III Lab (DJ19ICT301)		

Pre-requisite: -- Knowledge of

1. Solving a simultaneous linear equation using concept of matrices.
2. Calculus.

Objectives:

1. Understanding basic concepts of linear algebra.
2. Apply the concepts of vector spaces, linear transformations, matrices and inner product spaces in engineering.
3. To understand the concept of Fourier Series, its complex form and enhance the problem solving skill and Optimization techniques.

Outcomes: On completion of the course, learner will be able to:

1. Learn the basic notation of vector spaces and subspaces.
2. Apply the concept of vector spaces using linear transformations which is used in computer graphics and inner product spaces.
3. Apply the concepts of eigenvalue and eigenvectors and diagonalization in linear systems.
4. Expand the periodic function by using Fourier series and complex form of Fourier series.
5. Apply the concept of Linear & Non-Linear Programming Problem to the engineering problems.

Engineering Mathematics - III (DJ19ICC301)		
Unit	**Description**	**Duration**
1	**Vector Space and Inner Product Spaces:** Definition of vector space over $\mathbb{R}$, Subspaces. Linear combinations, Linearly dependent and independent vectors, Basis, Dimension. **Inner Product Spaces:** Dot product in $\mathbb{R}^n$, Definition of general inner product on a vector space over $\mathbb{R}$. Norm of a vector in an inner product space. Cauchy-Schwarz inequality. Orthogonal sets and orthonormal sets in an inner product space. Orthogonal and orthonormal bases. Gram-Schmidt orthogonalization process simple examples in $\mathbb{R}^2$, $\mathbb{R}^3$.	**12**
2	**Linear Transformations:** Definition and properties. Kernel and image of a linear transformation, Rank-Nullity Theorem. Invertible Linear Transformation, Relation between matrices and Linear Transformations, Change of bases.	**10**
3	**Matrices:** Eigen values, Eigen vectors and their properties. Cayley-Hamilton theorem (without proof) and its application. Similar matrices, diagonalization of matrix.	**8**

	Functions of square matrix. Singular value decomposition.	
4	**Calculus**: Gradient, directional derivatives, Jacobian, Hessian, convex sets, convex functions, and its properties.	**4**
5	**Optimization:** Unconstrained and Constrained optimization. Unconstrained optimization techniques: Newton's method, Quasi Newton method. Constrained optimization techniques: gradient descent, stochastic gradient descent, Penalty function method, Lagrange multiplier method, Karush–Kuhn–Tucker method, Simplex method, Penalty and Duality, Dual simplex method, Downhill simplex method.	**10**
6	**Fourier series:** Dirichlet's conditions, Fourier series of periodic functions with period 2π and 2L and Fourier series for even and odd functions. Half range sine and cosine Fourier series, Parseval's identities (without proof). Complex form of Fourier series, Orthogonal and Orthonormal set of functions.	**8**
	Total Lecture Hours	**52**

Engineering Mathematics - III Tutorial (DJ19ICT301)	
Tut.	**Suggested Tutorials**
1	Vector Space.
2	Inner Product Space.
3	Linear Transformation.
4	Eigen Value and Eigen Vector and Similarity of Matrices.
5	Cayley-Hamilton Theorem, Functions of square matrix.
6	Singular value decomposition.
7	Calculus.
8	Unconstrained Optimization Techniques.
9	Constrained Optimization Techniques.
10	Fourier Series.
11	Half-Range Fourier Series
12	Complex Form of Fourier Series.

Minimum eight tutorials from the above suggested list or any other tutorial based on syllabus will be included, which would help the learner to apply the concept learnt.

Books Recommended:

Text books:

1. Linear Algebra, Jin Ho Kwak and Sungpyo Hong, Second edition Springer (2004).
2. Introductory Linear Algebra- An applied first course, Bernard Kolman and David, R. Hill, 9th Edition Pearson Education, 2011.
3. Operation Research by Hira & Gupta,S Chand.
4. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition, John Wiley India, 2015.

Reference Books:

1. Elementary Linear Algebra, Stephen Andrilli and David Hecker, 5th Edition, Academic Press(2016).
2. Applied Abstract Algebra, Rudolf Lidl, Guter Pilz, 2 nd Edition, Springer 2004.
3. Contemporary linear algebra, Howard Anton, Robert C Busby, Wiley 2003.
4. Introduction to Linear Algebra, Gilbert Strang, 5 th Edition, Cengage Learning (2015).
5. Operations Research by S.D. Sharma Kedar Nath, Ram Nath & Co. Meerat.
6. Engineering optimization (Theory and Practice) by Singiresu S.Rao, New Age International publication.
7. Higher Engineering Mathematics, B. S. Grewal, 43rd Edition, Khanna Publishers, India, 2015.

Prepared by Checked by Head of the Department Principal

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Data Structures (DJ19ICC302)		
Course: Data Structures Laboratory (DJ19ICL302)		

Pre-requisite:

1. C – Programming

Objectives:

1. To introduce and familiarize students with linear and non-linear data structures, their use in fundamental algorithms and design & implementation of these data structures.
2. To expose students to analyze efficiency of algorithms (using asymptotic notation).
3. To make students familiar with various sorting and searching techniques, and their performance comparison.

Outcomes: On completion of the course, the learner will be able to:

1. Analyze the algorithms based on time and space complexity.
2. Solve the problem using appropriate data structure
3. Implement appropriate searching algorithm for a given problem.
4. Implement appropriate sorting algorithm for a given problem

Data Structures (DJ19AMC302)		
Unit	**Description**	**Duration**
1	**Review of** - Structures, Pointers, Pointers and Array, Pointers and Structures **Analysis of Algorithms:** Algorithms, Characteristics of an Algorithm, Time and Space Complexities, Order of Growth functions, Preliminary Asymptotic Notations. **Data Structures:** Introduction, need of data structures, types of data structures, Abstract Data Types (ADT)	3
2	**Linear Data Structures – LIST:** List as an ADT, Array-based implementation, Linked List implementation, Singly linked lists, Circular linked lists, Doubly-linked lists, All operations (Insertion, Deletion, Merge, Traversal, etc.) and their analysis, Applications of lists: Polynomial Addition and Subtraction	8
3	**Linear Data Structures – STACK:** Stack as an ADT, Operations, Array and Linked List representation of Stack, Applications – Reversing data, Conversion of Infix to prefix and postfix expression, Evaluating arithmetic expressions, balanced parenthesis, etc. **Linear Data Structures – QUEUE:** Queue as an ADT, Operations, Array and Linked List representation of Queue, Linear, Circular and Priority Queue, DEQUE, Applications – Queue Simulation.	10
4	**Non-Linear Data Structures – TREES:** Tree as an ADT, Binary Tree - Operations, Tree Traversals, Binary Search Tree (BST) - Operations, Expression Trees, AVL Trees - Operations, Heap- operations on heap, Applications of trees.	8

5	**Non-Linear Data Structures – GRAPHS:** Representation of Graph (Array & Linked List), Types of Graphs, Breadth-First Search (BFS), Depth–First Search (DFS), Breadth-First Traversal (BFT), Depth-First Traversal (DFT), Applications of graphs: Topological Sorting.	4
6	**Searching, Sorting Techniques:** Searching - Linear Search and its variant, Binary Search, Fibonacci Search Hashing - Hash Functions, Overflow handling, Collision & Collision Resolution Techniques, Linear hashing, Hashing with chaining, Separate Chaining, Open Addressing, Rehashing, Extendible Hashing. Bloom Filter, Bloom Filter Designs, Count Min Sketch. Sorting – Selection Sort, Heap Sort, Insertion Sort, Shell Sort, Radix Sort, Merge Sort, Quick Sort. Analysis of Searching and Sorting Techniques.	6
	Total	**39**

Data Structures Laboratory (DJ19ICL302))	
Exp.	**Suggested experiments**
1	Implementation of stack to find the just next greater number which can be formed using digits of given number.
2	Implementation of multi-stack in one array.
3	Using a stack find the length of the longest prefix of each of the given parenthesis's expressions that is valid, or 0 if there's no such prefix.
4	Implementation of Infix to Postfix. Transformation and its evaluation program.
5	Implementation of Infix to Prefix. Transformation and its evaluation program.
6	Using a queue find if the love mobiles can be brought into the order that the organizers want them to be.
7	Using the concepts of stack and queue sort the elements of a given array.
8	Implementation of circular queue menu driven program.
9	Implementation of double ended queue menu driven program.
10	Implementation of queue menu driven program.
11	Implementation of Priority queue program using array.
12	Implementation of Linked Lists menu driven program.
13	Implementation of different operations on linked list –copy, concatenate, split, reverse, count no. of nodes etc.
14	Implementation of polynomials operations (addition, subtraction) using Linked List.
15	Implementation of Linked Lists menu driven program (stack and queue).
16	Implement merging of even and odd positioned nodes into new linked list.
17	Implementation of construction of expression tree using postfix expression.
18	Implementation of BST program.
19	Write a program to verify whether the given 3 traversals are of the same tree or not.
20	Implementation of various operations on trees like – copying tree, mirroring trees, counting the number of nodes in the tree, counting only leaf nodes in the tree.
21	Implementation of Graph menu driven program (DFS & BFS).
22	Implementations of Shell sort, Radix sort and Insertion sort menu driven program.
23	Implementations of Heap & Heap Sort menu driven program.
24	Implementation of Advanced Bubble Sort, Insertion Sort and Selection Sort menu driven Program.
25	Implementation of searching methods (Index Sequential, Interpolation Search, Binary Search) menu driven program.
26	Implementation of hashing functions with different collision resolution techniques

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Books Recommended:

Text books:

1. R. F. Gilberg and B. A. Forouzan, "Data Structures – A Pseudocode Approach with C", 2nd Edition, Cengage Learning, 2005.
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", 2nd Edition, W. H. Freeman and Company 2008.
3. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, 2 nd Edition, 2011

Reference Books:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", 4th Edition, Pearson, 2014.
2. M. T. Goodritch, R. Tamassia, D. Mount, "Data Structures and Algorithms in C++", Wiley, 2004.
3. Kruse, Leung, Tondo, "Data Structures and Program Design in C", 2nd Edition, Pearson Education, 2013.
4. Tenenbaum, Langsam, Augenstein, "Data Structures using C", Pearson, 2004.
5. J. P. Tremblay and P. G. Sorenson, "Introduction to Data Structures and its Applications", 2nd Edition, McGraw-Hill, 1984.
6. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Addison-Wesley, 2010.
7. Reema Thareja, "Data Structures using C", Oxford, 2017.
8. Seymour Lipschutz, Data Structures, Schaum's Outline Series, 1st Edition, Tata McGraw-Hill, 2010.

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Database Management Systems (DJ19ICC303)		
Course: Database Management Systems Laboratory (DJ19ICL303)		

Pre-requisite: Computer Fundamentals

Course Objectives:

1. To learn effective database designing, development, maintenance, and efficient information retrieval.

Course Outcomes: On completion of the course, the learner will be able to:

1. Demonstrate ER modeling and Relational mapping to construct a database for given real-life problems and apply normalization to it.
2. Construct SQL queries to perform operations on the database.
3. Examine transaction processing and recovery mechanisms on a database.
4. To understand various advanced databases and design an application using them.

Database Management Systems (DJ19ICC303)		
Unit	**Description**	**Duration**
1	**Introduction Database Concepts:** Introduction, Characteristics of databases, File system v/s Database system, Users of Database system, Data Independence, DBMS system architecture, Database Administrator	3
2	**Entity–Relationship Data Model** The Entity-Relationship (ER) Model: Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys, Relationship constraints: Cardinality and Participation Extended Entity-Relationship (EER) Model: Generalization, Specialization and Aggregation **Relational Model and Relational Algebra** Introduction to the Relational Model, relational schema and concept of keys, Mapping the ER and EER Model to the Relational Model Relational Algebra – unary and set operations, Relational Algebra Queries.	6
3	**Structured Query Language (SQL)** Overview of SQL, Data Definition Commands, and Data Manipulation commands, Data Control commands, Transaction Control Commands. Integrity constraints - key constraints, Domain Constraints, Referential integrity, check constraints, set and string operations, aggregate function, group by clause, having Clause Views in SQL, joins, Nested and complex queries, Triggers Introduction to PL/SQL - Procedures and Functions	8
4	**Relational–Database Design** Pitfalls in Relational-Database designs, Concept of normalization, Functional Dependencies, First Normal Form, 2NF, 3NF, BCNF	6

5	**Transactions Management and Concurrency** Transaction concept, Transaction states, ACID properties, Concurrent Executions, Serializability – Conflict and View, Concurrency Control: Lock-based, Timestamp-based protocols, Deadlock Handling **Recovery System:** Introduction to Recovery system, Log based Recovery, Shadow paging.	6
6	**Advance Databases:** Why NoSQL? SQL vs NoSQL, Types of NoSQL databases: Key-value store, Document database, Column-oriented database, Graph database **MongoDB:** Key features, MongoDB Query Language: Data type, create database - Collections and Documents, Updating and Querying database, Querying through Indexes, **Rocksdb:** Overview, Opening/closing, Read/Write, Rocksdb Block Based Table Format, Log File Format, Benefits and Limitations. **Introduction:** Time Series Databases and Spatial and Temporal Databases	10
	Total	**39**

Database Management Systems Laboratory (DJ19ICL303)

Exp.	**Suggested experiments**
1	Identify the case study and detail statement of problem. Design an Entity-Relationship (ER) /Extended Entity-Relationship (EER) Model.
2	Mapping ER/EER to Relational schema model.
3	Create and populate database using Data Definition Language (DDL) and DML Commands (Apply various Integrity Constraints)
4	Perform Simple queries, string manipulation operations.
5	Nested queries and Complex queries.
6	Perform Join operations.
7	Views and Triggers.
8	Procedures (PL/SQL)
9	Examine the consistency of database using concurrency control technique (Locks)
10	Perform CRUD operations in MongoDB.
11	Mini project using any given/recent database. (RDBMS, Rocksdb, Cassandra, MongoDB, Redis, Neo4J, InfluxDB/KairosDB, PostgreSQL etc.)

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Books Recommended:

Text books:

1. Korth, Silberchatz, Sudarshan, ―Database System Concepts, 7th Edition, McGraw – Hill, 2019.
2. Elmasri and Navathe, ―Fundamentals of Database Systems, 7th Edition, Pearson education, 2016.
3. Peter Rob and Carlos Coronel, ―Database Systems Design, Implementation and Management, Thomson Learning, 5th Revised Edition, 2002.

4. G. K. Gupta ―Database Management Systems, 3rd Edition, McGraw – Hill, 2018.
5. Xun (Brian) Wu, Sudarshan Kadambi, Devram Kandhare, Aaron Ploetz ― Seven NoSQL Databases in a Week, Packt Publishing Limited, 2018

Reference Books:

1. Dr. P.S. Deshpande, SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press, 2012
2. Gillenson, Paulraj Ponniah, ―Introduction to Database Management‖, Wiley Publication, 1st , 2007
3. Sharaman Shah, ―Oracle for Professional, Shroff Publishers & Distributers Private Limited, 1st edition, 2008
4. Raghu Ramakrishnan and Johannes Gehrke, ― Database Management Systems, 3rd Edition, McGraw – Hill, 2014.
5. Lynn Beighley, "Head First SQL", O'Reilly Media, 2007.
6. Gaurav Vaish ―Getting started with NoSQL, Packt Publishing Limited, 2013.
7. https://www.mongodb.com/
8. https://rocksdb.org

Evaluation Scheme:

Semester End Examination (A):
Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:
1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Laboratory work will be based on **DJ19ICL303** with minimum 12 experiments to be incorporated.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 marks
ii. Journal Documentation (Write-up and Assignments: 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Department Coordinator Principal

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Discrete Structures (DJ19ICC304)		
Course: Discrete Structures Tutorial (DJ19ICT304)		

Pre-requisite: --

Objectives:

1. To cultivate clear thinking and creative problem solving.
2. To thoroughly train in the construction and understanding of mathematical proofs. Exercise common mathematical arguments and proof strategies.
3. To thoroughly prepare for the mathematical aspects of other Computer Engineering courses.

Outcomes: On completion of the course, the learner will be able to:

1. Verify the correctness of an argument using propositional and predicate logic and truth tables.
2. Understand relations, Diagraph and lattice, functions.
3. Apply principles and concepts of graph theory in practical situations.
4. Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.
5. Understand the different Algebraic structures and demonstrate use of groups and codes in Encoding and Decoding.

Discrete Structures (DJ19ICC304)		
Unit	**Description**	**Duration**
1	**Sets and Logic:** **Set Theory:** Introduction to Set Theory, Venn diagrams, Operations on Sets, Power sets, Laws of set theory, Cartesian Product, Partitions of sets, The Principle of Inclusion and Exclusion, Introduction to Fuzzy sets, Properties of Fuzzy sets, Fuzzy set operations, Fuzzy Cartesian product **Mathematical Logic:** Propositions and Logical operations, Truth tables, Laws of Logic, Logical Equivalence, Normal Forms, Predicates, Fallacies, Quantifiers, Mathematical induction Introduction to First Order Predicate Logic, Inference Rules: Universal and Existential instantiation, Universal and Existential generalization, Universal Modus Ponens, Universal Modus Tollens, Multiple Quantifiers, Negation of more than one variable	12
2	**Relations, Posets and Lattices** **Introduction:** Relations and their properties, Paths and Digraphs, Types of binary relations, Operations on relations, Equivalence relations: Closures, Warshall's algorithm, Composition of relations.	10

	Introduction to Fuzzy Relations. Properties of Fuzzy relations, Fuzzy composition of relations: Max-min composition and Max-product composition **Posets and Lattices:** Partial ordered sets, Hasse diagram, Lattice and its types, Boolean algebra.	
3	**Functions** Types of functions - Injective, Surjective and Bijective, Composition of functions, Identity and Inverse function, Pigeon hole principle	4
4	**Graphs and Trees** **Introduction to Graph theory:** Definitions, Paths, circuits, connectivity, Types of Graphs, Eulerian and Hamiltonian Graph, Sub Graphs, Planar Graphs, Chromatic number, Graph coloring, Isomorphism of graphs, **Introduction to Trees:** Trees, rooted trees, path length in rooted trees, Prefix codes and optimal prefix codes	4
5	**Generating Function and Recurrence relation**: Recurrence Relation: linear recurrence relation with constant coefficients, Homogeneous and non-homogeneous recurrence relation, Generating function	4
6	**Number Theory and Algebra** **Groups:** Binary operations, Group, Semigroup, Monoid, Sub-group, Cyclic group, Homomorphism and Isomorphism of groups, Cosets. **Coding theory:** Group codes, Parity-check and Generator matrix, Hamming codes, Maximum likelihood technique **Rings and Fields:** Definition, Sub rings, Integral domain, Field, Integer modulo n, Ring homomorphism.	5
	Total	**39**

Minimum eight tutorials based on syllabus will be conducted. Mini project relevant to the subject may be included, which would help the learner to apply the concept learnt.

Tutorials: Discrete Structures Tutorial (DJ19ICT304)

1	Problems on Set Theory
2	Problems on Mathematical Logic
3	Problems on Relations
4	Problems on Posets and Lattices
5	Problems on Functions
6	Problems on Graph theory
7	Problems on Trees
8	Problems on Generating Function
9	Problems on Recurrence relation
10	Problems on Groups
11	Problems on Coding theory
12	Problems on Rings and Field

Books Recommended:

Text books:

1. Bernad Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman, "Discrete Mathematical Structures", Pearson Education 2015.
2. C.L. Liu, D P Mohapatra, "Elements of Discrete Mathematics", 4E, McGraw-Hill 2012.
3. Douglas B West.," Introduction to Graph Theory" 2nd Edition, Eastern Economy Edition published by PHI Learning Pvt. Ltd.
4. Ralph Grimaldi, "Discrete and Combinatorial Mathematics" 5th ed, Pearson Education
5. S.N. Sivanandam, S. N. Deepa, "Principles of Soft Computing", 2nd Edition, 2011 Wiley India Pvt. Ltd

Reference Books:

1. Y N Singh, "Discrete Mathematical Structures", Wiley-India.
2. J. L. Mott, A. Kandel, T. P. Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India.
3. J. P. Trembley, R. Manohar "Discrete Mathematical Structures with Applications to Computer Science", McGraw-Hill.
4. Seymour Lipschutz, Marc Lipson, "Discrete Mathematics", Schaum's Outline Series McGraw Hill Education.

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Digital Logic Design and Applications(DJ19ICC305)		
Course: Digital Logic Design and Applications Laboratory (DJ19ICL305)		

Pre-requisite: --

1. Basics of Signals

Objectives:

1. To introduce the fundamental concepts and methods for design of digital circuits and a pre-requisite for computer organization and architecture, microprocessor systems.
2. To provide the concept of designing Combinational and sequential circuits.

Outcomes: On completion of the course, the learner will be able to:

1. Understand different number systems and their conversions.
2. Analyze and minimize Boolean expressions.
3. Design and analyze combinational circuits.
4. Design and analyze sequential circuits
5. Design and analyze counters and registers.
6. Understand programming logic devices.

Digital Logic Design and Applications(DJ19ICC305)		
Unit	**Description**	**Duration**
1	**Number Systems and Codes:** Introduction to number system and conversions: Binary, Octal, Decimal and Hexadecimal Number Systems, Binary arithmetic: addition, subtraction (1's and 2's complement), multiplication and division. Octal and Hexadecimal arithmetic: Addition and Subtraction (7's and 8's complement method for octal) and (15's and 16's complement method for Hexadecimal). Codes: Gray Code, BCD Code, Excess-3 code, Error Detection and Correction: Hamming codes	7
2	**Boolean Algebra and Logic Gates:** Theorems and Properties of Boolean Algebra, Boolean functions, Boolean function reduction using Boolean laws, Canonical forms, Standard SOP and POS form. Basic Digital gates: NOT, AND, OR, NAND, NOR, EXOR, EX-NOR, positive and negative logic, K-map method 2 variable, 3 variable, 4 variable, Don't care condition, Quine-McClusky Method, NAND-NOR Realization.	7
3	**Combinational Logic Design:** Introduction, Half and Full Adder, Half subtractor Full Subtractor, Four Bit Ripple adder, look ahead carry adder, 4 bit adder subtractor, one digit BCD Adder, Multiplexer, Multiplexer tree, Demultiplexer, Demultiplexer tree, Encoders Priority encoder, Decoders, One bit, Two bit , 4-bit Magnitude Comparator, ALU IC 74181.	8
4	**Sequential Logic Design:** Application of Sequential Logic, Introduction: SR latch, Concepts of Flip Flops: SR, D, J-K, T, Truth Tables and Excitation Tables of all types, Race around condition, Master Slave J-K Flip Flops, Flip-flop conversion, Timing diagram	8

5	**Counters and Registers :** Design of Asynchronous and Synchronous Counters, Modulus of the Counters, UPDOWN counter, Shift Registers: SISO, SIPO, PIPO, PISO Bidirectional Shift Register, Universal Shift Register, Ring and twisted ring/Johnson Counter, sequence generator.	6
6	**Programming Logic Devices:** Concepts of Programmable Array Logic (PAL) and Programming Logic Array (PLA). Introduction to Sensors, Types of sensors: Capacitive, Thermal and Magnetic sensors, Analog to Digital Conversion.	**3**
	Total	**39**

Digital Logic Design and Applications Laboratory (DJ19ICL305)	
Exp.	**Suggested experiments**
1	To study and verify the truth table of various logic gates using ICs and realize Boolean expressions using gates
2	To realize basic gates using universal gates.
3	To realize binary to gray code and gray code to binary converter.
4	To realize parity generator and detector.
5	To realize arithmetic circuits i) Half adder ii) Full adder iii) Half subtractor iv) Full subtractor
6	To realize 2 bit magnitude comparator
7	To Study multiplexer IC and realization of full adder using multiplexer IC
8	To Study decoder IC and realization of combinational logic using decoder IC.
9	Study of flip-flops using IC's.
10	To realize asynchronous 3 bit up counter.
11	To realize shift registers using flip flops.
12	Case study on practical uses of flip-flops and Counters.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Books Recommended:

Text books:

1. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill,3rd edition, 2003
2. M. Morris Mano, "Digital Logic and computer Design", PHI.,2016
3. Norman Balabanian, "Digital Logic Design Principles", Wiley.,2007

Reference Books:

1. Donald p Leach, Albert Paul Malvino, "Digital principles and Applications", Tata McGraw, 7th edition, 2011.
2.Yarbrough John M., "Digital Logic Applications and Design ", West Publishing Company, 1997
3.Douglas L. Perry, "VHDL Programming by Example", Tata McGraw Hill, 4th Edition, 2002.

Prepared by Checked by Department Coordinator Principal

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Programming Laboratory – I (Python Programming)(DJ19ICL306)		

Pre-requisite: --

1. C Programming

Objectives:

1. To learn the basic and OOP concepts of Python.
2. To study various advanced python concepts like inheritance, exception handling, modules etc.
3. Learn to develop GUI based standalone and web application.

Outcomes: On completion of the course, the learner will be able to:

1. Understand basic and object-oriented concepts, data structure implementation in python.
2. Apply file, directory handling and text processing concepts in python.
3. Apply database connectivity, client-server communication using python.
4. Develop python-based application (web/Desktop) using Django web framework/Tkinter.

Programming Laboratory – I (Python Programming)(DJ19ICL306)		
Unit	**Description**	**Duration**
1	**Python basics** Data types in python, Operators in python, Input and Output, Control statement, Arrays in python, String and Character in python, Functions, List and Tuples, Dictionaries.	4
2	**Control Statements and Functions:** If statement, if-elif-else, Repetition using while loop, for loop, defining a Function, Checking & Setting Your Parameters, Default arguments, Variable length arguments, Defining and calling functions within a function, Layers of Functions, Lambda and Filter, Zip (), Map (), Reduce () function, recursion, Function Decorators.	6
3	**Introduction to OOP:** Creating a Class, Self-Variables, Constructors, Types of Methods, Constructors in Inheritance, Polymorphism, the super () Method, Method Resolution Order (MRO), Operator Overloading, Method Overloading & Overriding, Interfaces in Python Exceptions Handling: Exceptions, Exception Handling, Types of Exceptions, Except Block, assert Statement, User Defined Exceptions	6
4	**Advanced Python** Building Modules, Packages: Python Collections Module, Opening and Reading Files and Folders (Python OS Module, Python Datetime Module, Python Math and Random Modules, Text Processing, Regular expression in python	3
5	**Python Integration Primer Graphical User interface using Tkinter** : Form designing, Networking in Python: Client Server socket programming Python database connectivity: Data Definition Language (DDL), and Data Manipulation Language (DML)	3

6	**Django Framework** **Introduction to Django**: Django's take on MVC: Model, View and Template, Installation and set upmodels.py, urls.py, views.py, Setting up database connections Managing Users & the Django admin tool Designing a good URL scheme, Generic Views, Form classes, Validation, Authentication, Advanced Forms processing techniques	**6**
	Total	**26**

Programming Laboratory – I (Python Programming)(DJ19AML306)	
Exp.	**Suggested experiments**
1	Write python programs to understand Expressions, Variables, Quotes, Basic Math operations.
2	Write a Python program to implement Basic String Operations & String Methods.
3	Write a Python program to implement functions of List, Tuples, and Dictionaries.
4	Write a Python program to implement Arrays (1D, 2D) applications.
5	Write python programs to demonstrate applications of different decision-making statements.
6	Write a Python program to implement Functions and Recursion.
7	Write a Python program to implement Programs based on Lambda, Map, and Reduce Functions.
8	Write a Python program to implement program to implement concept of Function decorators.
9	Write python programs to implement Classes & objects, Constructors
10	Write python programs to implement Inheritance & Polymorphism.
11	Write python programs to implement Exception handling.
12	Write python programs to understand different File handling operations with exception handling.
13	Write python programs to implement database connectivity and DDL and DML commands in Python using SQLite.
14	Write python programs to understand GUI designing (Programs based on GUI designing using Tkinter.
15	Write a Python program to implement Web based application with Django Framework.

Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Books Recommended:

Text books:

1. Dr. R. Nageswara Rao, "Core Python Programming", 3rd Edition, Dreamtech Press, 2018.

2. Mark Lutz, "Learning Python", 5th Edition, Oreilly Publication, 2013.

3. E Balagurusamy, "Introduction to computing and problem-solving using Python", McGraw Hill Education, 2018

Reference Books:

1. Zed A. Shaw, "Learn Python the Hard Way", 3rd Edition, Addison–Wesley Publication, 2014.

2. Laura Cassell, Alan Gauld, "Python Projects", Wrox Publication, 2015.

Program: **Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology**	**S.Y B.Tech**	**Semester: III**
Course: Innovative Product Development (DJ19A2)		

Pre-requisite: --

Objectives:

1. To acquaint the students with the process of identifying the need (considering a societal requirement) and ensuring that a solution is found out to address the same by designing and developing an innovative product.
2. To familiarize the students with the process of designing and developing a product, while they work as part of a team.
3. To acquaint the students with the process of applying basic engineering fundamentals, so as to attempt at the design and development of a successful value added product.
4. To inculcate the basic concepts of entrepreneurship and the process of self-learning and research required to conceptualise and create a successful product.

Outcomes: On completion of the course, the learner will be able to:

1. Identify the requirement for a product based on societal/research needs.
2. Apply knowledge and skills required to solve a societal need by conceptualising a product, especially while working in a team.
3. Use standard norms of engineering concepts/practices in the design and development of an innovative product.
4. Draw proper inferences through theoretical/ experimental/simulations and analyse the impact of the proposed method of design and development of the product.
5. Develop interpersonal skills, while working as a member of the team or as the leader.
6. Demonstrate capabilities of self-learning as part of the team, leading to life-long learning, which could eventually prepare themselves to be successful entrepreneurs.
7. Demonstrate product/project management principles during the design and development work and also excel in written (Technical paper preparation) as well as oral communication

Guidelines for the proposed product design and development:

- Students shall form a team of 3 to 4 students (max allowed: 5-6 in extraordinary cases, subject to the approval of the department review committee and the Head of the department).
- Students should carry out a survey and identify the need, which shall be converted into conceptualization of a product, in consultation with the faculty supervisor/head of department/internal committee of faculty members.
- Students in the team shall understand the effective need for product development and accordingly select the best possible design in consultation with the faculty supervisor.
- Students shall convert the best design solution into a working model, using various components drawn from their domain as well as related interdisciplinary areas.
- Faculty supervisor may provide inputs to students during the entire span of the activity, spread over 2 semesters, wherein the main focus shall be on self-learning.
- A record in the form of an activity log-book is to be prepared by each team, wherein the team can record weekly progress of work. The guide/supervisor should verify the recorded notes/comments and approve the same on a weekly basis.

- The design solution is to be validated with proper justification and the report is to be compiled in a standard format and submitted to the department. Efforts are to be made by the students to try and publish a technical paper, either in the institute journal, "Techno Focus: Journal for Budding Engineers" or at a suitable publication, approved by the department research committee/ Head of the department.
- The focus should be on self-learning, capability to design and innovate new products as well as on developing the ability to address societal problems. Advancement of entrepreneurial capabilities and quality development of the students through the year long course should ensure that the design and development of a product of appropriate level and quality is carried out, spread over two semesters, ie during the semesters III and IV.

Guidelines for Assessment of the work:

- The review/ progress monitoring committee shall be constituted by the Head of the Department. The progress of design and development of the product is to be evaluated on a continuous basis, holding a minimum of two reviews in each semester.
- In the continuous assessment, focus shall also be on each individual student's contribution to the team activity, their understanding and involvement as well as responses to the questions being raised at all points in time.
- Distribution of marks individually for the both reviews as well as for the first review during the subsequent semester shall be as given below:
- Marks awarded by the supervisor based on log-book: 20
- Marks awarded by review committee: 20
- Quality of the write-up: 10

Review/progress monitoring committee may consider the following points during the assessment.

- The entire design proposal shall be ready, including components/system selection as well as the cost analysis.
- Two reviews will be conducted based on the presentation given by the student's team.
- First shall be for finalization of the product selected.
- Second shall be on finalization of the proposed design of the product.

The overall work done by the team shall be assessed based on the following criteria:

1. Quality of survey/ need identification of the product.
2. Clarity of Problem definition (design and development) based on need.
3. Innovativeness in the proposed design.
4. Feasibility of the proposed design and selection of the best solution.
5. Cost effectiveness of the product.
6. Societal impact of the product.
7. Functioning of the working model as per stated requirements.
8. Effective use of standard engineering norms.
9. Contribution of each individual as a member or the team leader.
10. Clarity on the write-up and the technical paper prepared.

Guidelines for Assessment of Semester Reviews:

- The write-up should be prepared as per the guidelines given by the department.
- The design and the development of the product shall be assessed through a presentation and demonstration of the working model by the student team to a panel of Internal and External Examiners, preferably from industry or any research organisations having an experience of more than five years, approved by the Head of the Institution

Prepared by Checked by Department Coordinator Principal

Program:
Second Year B. Tech. in IOT and Cyber Security with Block Chain Technology

S.Y B.Tech Semester: III

Course: Constitution of India (DJ19A3)

Pre-requisite:

Objectives:
1. To provide basic information about Indian constitution.
2. To identify individual role and ethical responsibility towards society.
3. To understand human rights and its implications.

Outcomes: On completion of the course, learner will be able to
1. Have general knowledge and legal literacy and thereby to take up competitive examinations.
2. Understand state and central policies, fundamental duties.
3. Understand Electoral Process, special provisions.
4. Understand powers and functions of Municipalities, Panchayats and Co-Operative Societies,
5. Understand Engineering ethics and responsibilities of Engineers
6. Understand Engineering Integrity & Reliability

Constitution of India(DJ19A3)		
Unit	**Description**	**Duration**
1	**Introduction to the Constitution of India** The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.	8
2	**Directive Principles of State Policy:** Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India.	10
3	**State Executives:** Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th & 91st Amendments	7
4	**Special Provisions:** For SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions. **Human Rights:** Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India Powers and functions of Municipalities, Panchayats and Co – Operative Societies	12
5	**Scope & Aims of Engineering Ethics:** Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering	7
	Total	**39**

Books Recommended:

Text books:

1. Durga Das Basu: "Introduction to the Constitution on India", (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins "Engineering Ethics" Thompson Asia, 2003-08-05.

Reference Books:

1. M. V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.
2. M. Govindarajan, S. Natarajan, V. S. Senthilkumar, "Engineering Ethics", Prentice – Hall of India Pvt. Ltd. New Delhi, 2004
3. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Pvt. Ltd., New Delhi, 2011.
4. Latest Publications of Indian Institute of Human Rights, New Delhi

Website Resources:

1. www.nptel.ac.in
2. www.hnlu.ac.in
3. www.nspe.org
4. www.preservearticles.co