Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and Detailed Syllabus (DJ19)

Second Year B.Tech

in

INFORMATION TECHNOLOGY

(Semester III and IV)

Revision: 1 (2019)
With effect from the Academic Year: 2020-2021

1st July, 2020

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Scheme for Second Year Undergraduate Program in Information Technology: Semester III (Autonomous)
(Academic Year 2020-2021)

SEMESTER III

Sr. No.	Course Code	Course	Teaching Scheme				Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits Earned	
			Theory (hrs)	Practical (hrs)	Tut (hrs)	Credits	Duration (hrs)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Term Work Total	CA Total (B)			
1	DJ19ITC301	Discrete Structures	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	**3**	**4**
	DJ19ITT301	Discrete Structures Tutorial	--	--	1	**1**	--	--	--	--	--	--	--	--	--	25	**25**	**25**	**1**	
2	DJ19ITC302	Data Structures and Algorithms	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	**3**	**4**
	DJ19ITL302	Data Structures and Algorithms Laboratory	--	2	--	**1**	--	--		--	25	**25**	--	--	--	25	**25**	**50**	**1**	
3	DJ19ITC303	Database Management System	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	**3**	**4**
	DJ19ITL303	Database Management System Laboratory	--	2	--	**1**	--	--		--	25	**25**	--	--	--	25	**25**	**50**	**1**	
4	DJ19ITC304	Digital Logic Design	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	**3**	**4**
	DJ19ITL304	Digital Logic Design Laboratory	--	2	--	**1**	--	--	--	--	25	**25**	--	--	--	25	**25**	**50**	**1**	
5	DJ19ITC305	Operating System	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	**3**	**4**
	DJ19ITL305	Operating System Laboratory	--	2	--	**1**	--	--		--	25	**25**	--	--	--	25	**25**	**50**	**1**	
6	DJ19ITL306	Programing Laboratory 1 (Java and Advanced Java)	--	4	--	**2**	--	--	--	--	50	**50**	--	--	--	50	**50**	**100**	**2**	**2**
7	DJ19A2	Innovative Product Development I	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8	DJ19A3	Constitution of India	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Total	**16**	**14**	**1**	**22**	**15**	**375**	**0**	**0**	**150**	**525**	**125**	**125**	**125**	**175**	**300**	**825**	**22**	

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Scheme for Second Year Undergraduate Program in Information Technology: Semester IV (Autonomous)

SEMESTER IV

Sr. No.	Course Code	Course	Teaching Scheme				Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits Earned	
			Theory (hrs)	Practical (hrs)	Tut (hrs)	Credits	Duration (hrs)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Term Work Total	CA Total (B)			
1	DJ19ITC401	Probability & Statistics	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	3	**4**
	DJ19TT401	Probability & Statistics Tutorial	--	--	1	**1**	--	--	--	--	--	--	--	--	--	25	**25**	**25**	1	
2	DJ19ITC402	Formal Languages and Automata Theory	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	3	**4**
	DJ19ITL402	Formal Languages and Automata Theory Tutorial	--	--	1	**1**	--	--	--	--	--	--	--	--	--	25	**25**	**25**	1	
3	DJ19ITC403	Design and Analysis of Algorithms	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	3	**4**
	DJ19ITL403	Design and Analysis of Algorithms Laboratory	--	2	--	**1**	--	--	--	--	25	**25**	--	--	--	25	**25**	**50**	1	
4	DJ19ITC404	Computer Networks	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	3	**4**
	DJ19ITL404	Computer Networks Laboratory	--	2	--	**1**	--	--	25	--	--	**25**	--	--	--	25	**25**	**50**	1	
5	DJ19ITC405	Web Programming	3	--	--	**3**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	3	**4**
	DJ19ITL405	Web Programming Laboratory	--	2	--	**1**	--	--	--	--	25	**25**	--	--	--	25	**25**	**50**	1	
6	DJ19ITL406	Programing Laboratory 2 (Python)	--	2	--	**1**	--	--	--	25	--	**25**	--	--	--	25	**25**	**50**	1	**1**
7	DJ19IHC1	Universal Human Values	2	--	--	**2**	3	75	--	--	--	**75**	25	25	25	--	**25**	**100**	2	**3**
8	DJ19IHT1	Universal Human Values Tutorial	--	--	1	**1**	--	--	--	--	--	--	--	--	--	25	**25**	**25**	1	
9	DJ19A4	Innovative Product Development II	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Total	**17**	**10**	**3**	**24**	**18**	**450**	**25**	**25**	**50**	**550**	**150**	**150**	**150**	**175**	**325**	**875**	**24**	

Program: Second Year Information Technology	Semester : III
Course : Discrete Structures	Course Code: DJ19ITC301
Course : Discrete Structures Tutorial	Course Code: DJ19ITT301

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	25
3	-	1*	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				-	--	--	-	25	25	

***Batch wise tutorials are to be conducted.**

Pre-requisite: Engineering Mathematics – I and Engineering Mathematics – II

Course Objectives: The objective of this course is to provide a solid foundation in discrete mathematics required to solve engineering problems. The course familiarizes students with the concepts of Set Theory, Relations, Functions and elementary counting techniques. It will also familiarize students with different techniques and algorithms involved in graphs and trees, different algebraic structures like Group, Ring and Lattice Theory.

Course Outcomes: On successful completion of this course, student should be able to:

1. Comprehend discrete mathematical preliminaries.
2. Apply Relations and Functions to solve Engineering problems.
3. Apply various concepts of Group and Ring Theory to solve Engineering problems.
4. Apply concept of Graphs, Trees and Lattice Theory in formal representation of various computing constructs.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Set Theory:** Definition of Sets, Venn Diagrams, complements, cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations.	07
2	**Relation:** Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.	06
3	**Graphs& Trees:** Definitions, Types of graphs, Paths and circuits: Eulerian and Hamiltonian, Sub Graphs, Isomorphism of graphs Planar Graphs Graph Coloring Introduction to Trees, Applications of Trees	08

4	**Group Theory:** Algebraic structures with one binary operation: semigroup, monoid and group, Abelian group cosets and Lagrange's theorem, permutation groups, Isomorphism, Homomorphism and Automorphism, Cyclic groups generators and evaluation of powers, Normal subgroups. **Ring Theory:** rings, integral domain sand fields. Codes and group codes Coding theory: Coding of binary information and error detection, decoding and error correction	**15**
5	**Lattice theory:** Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, prepositional calculus.	**06**

List of Tutorials:

1. Set Theory
2. Relation and Functions
3. Types of Graphs
4. Isomorphism of Graph, Graph Coloring
5. Trees and its Application
6. Types of Group, Isomorphism, Homomorphism, Automorphism of Groups
7. Cyclic Group, Normal Subgroups
8. Ring, integral domain sand fields
9. Coding theory
10. Lattice Theory

Books Recommended:

Text books:

1. Bernard Kolman, Robert C. Busby, and Sharon Ross, "Discrete Mathematical Structures", 5th Edition, PHI, 2003.
2. J. P. Tremblay, and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, 2014.
3. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4th Edition, Tata McGraw-Hill, 2017.

Reference Books:

1. K. H. Rosen, "Discrete Mathematics and applications", 5th Edition, TataMcGraw Hill, 2003.
2. Norman L Briggs, "Discrete Mathematics", 2nd edition, Oxford University Press, 2002.
3. Bernard Menezes, "Network Security and Cryptography", Cengage Learning Publication, 2010.
4. Susanna S. Epp, "Discrete Mathematics with Applications", 4th Edition, Cengage Learning, 2005.
5. Joseph A. Gallian, "Contemporary Abstract Algebra", 9th Edition, Cengage Learning, 2015.

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.

Tutorial: (Term work)
Term work shall consist of minimum 8 Tutorials covering the entire modules.
The distribution of marks for term work shall be as follows:
Tutorial– 25 marks

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

Prepared by Checked by Head of the Department Principal

Program: Second Year Information Technology Engineering	Semester : III
Course : Data Structures and Algorithms	Course Code: DJ19ITC302
Course : Data Structures and Algorithms Laboratory	Course Code: DJ19ITL302

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	25	15	10	25	

Pre-requisite: Knowledge of -

1. C – Programming

Course Objectives: The objective of the course is to introduce and familiarize students with linear and non-linear data structures, their use in fundamental algorithms and design & implementation of these data structures. To expose students to analyze efficiency of algorithms (using asymptotic notation). To make students familiar with various sorting and searching techniques, and their performance comparison.

Course Outcomes: On successful completion of this course, student should 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.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Review of** - Structures, Pointers, Pointers and Array, Pointers and Structures, Recursion.	02
2	**Analysis of Algorithms:** Algorithms, Characteristics of an Algorithm, Time and Space Complexities, Order of Growth functions, Preliminary Asymptotic Notations. Few examples of analysis of algorithms (like Fibonacci, maximum subsequence sum, prefix average etc.) **Data Structures:** Introduction, need of data structures, types of data structures, Abstract Data Types (ADT)	04
3	**Linear Data Structures – LIST:** List as an ADT, Array-based implementation, Linked List implementation, singly linked lists, circularly linked lists, doubly-linked lists, All operations (Insertion, Deletion, Merge, Traversal, etc.) and their analysis, Applications of lists.	05

4	**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.	**04**
5	**Linear Data Structures – QUEUE:** Queue as an ADT, Operations, Array and Linked List representation of Queue, Linear, Circular and Priority Queue, DEQueue, Applications – Queue Simulation.	**04**
6	**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.	**10**
7	**Non Linear Data Structures – GRAPHS:** Representation of Graph (Array & Linked List), Types of Graph, Breadth-First Search (BFS), Depth–First Search (DFS), Breadth-First Traversal (BFT), Depth-First Traversal (DFT), Applications of graphs.	**05**
8	**Searching, Sorting Techniques:** Searching - Linear Search, Binary Search, Hashing - Hash Functions, Overflow handling, Collision & Collision Resolution Techniques, Linear hashing, Hashing with chaining, Separate Chaining, Open Addressing, Rehashing, Extendible Hashing. Sorting – Bubble Sort, Selection Sort, Heap Sort, Insertion Sort, Shell Sort, Radix Sort. Analysis of Searching, Sorting Techniques.	**08**

List of Laboratory Experiments: (Any 10 to 12)

1. Implementations of stack menu driven program
2. Implementation of multi-stack in one array.
3. Implementations of Infix to Postfix. Transformation and its evaluation program.
4. Implementations of Infix to Prefix. Transformation and its evaluation program.
5. Implementations of circular queue menu driven program.
6. Implementations of double ended queue menu driven program.
7. Implementations of queue menu driven program.
8. Implementation of Priority queue program using array.
9. Implementations of Linked Lists menu driven program.
10. Implementation of different operations on linked list –copy, concatenate, split, reverse, count no. of nodes etc.
11. Implementation of polynomials operations (addition, subtraction) using Linked List.
12. Implementations of Linked Lists menu driven program (stack and queue).
13. Implementations of Binary Tree menu driven program.
14. Implementation of Binary Tree Traversal program.
15. Implementation of construction of expression tree using postfix expression.
16. Implementations of BST program.
17. Implementation of various operations on tree like – copying tree, mirroring a tree, counting the number of nodes in the tree, counting only leaf nodes in the tree.
18. Implementation of Preorder traversal of a threaded binary tree.
19. Implementations of Graph menu driven program (DFS & BSF).
20. Implementations of Shell sort, Radix sort and Insertion sort menu driven program.
21. Implementations of Heap & Heap Sort menu driven program.
22. Implementations of Advanced Bubble Sort, Insertion Sort and Selection Sort menu driven Program.
23. Implementations of searching methods (Index Sequential, Interpolation Search, Binary Search) menu driven program.
24. Implementation of hashing functions with different collision resolution techniques

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

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.

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.

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.

Laboratory:

1. Oral & Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Consisting of **Two Compulsory Class Tests** Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
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)

Term work shall consist of minimum 10 - 12 experiments and minimum 2 assignments.

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 Head of the Department Principal

Program: Second Year Information Technology	Semester : III
Course : Database Management System	Course Code: DJ19ITC303
Course : Database Management System Laboratory	Course Code: DJ19ITL303

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Assignment/ Mini project		
				--	--	25	15	10	25	

Pre-requisite: Computer Basics

Course Objectives: The course intends to introduce the students to the management of database systems, with an emphasis on how to design, organize, maintain and retrieve information efficiently and effectively from a database.

Course Outcomes: On successful completion of this course, student should be able to:

1. Design an optimized database.
2. Construct SQL queries to perform operations on database.
3. Explain the concepts of transaction management.
4. Demonstrate appropriate transaction recovery techniques for a given problem.
5. Apply indexing mechanisms for efficient retrieval of information from database.
6. Work effectively as a member of a team.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Introduction to Database Concepts:** Introduction, Characteristics of databases, File system V/s Database system, Users of a Database system, Schemas, and Instances, Data Independence, DBMS Architecture, Database Administrator (DBA), Role of a DBA, Introduction to latest databases like NoSQL database, Graph database.	03
2	**Entity–Relationship Data Model**: Conceptual Modeling of a database, The Entity-Relationship (ER) Model, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Weak Entity Types Generalization, Specialization and Aggregation, Extended Entity-Relationship (EER) Model.	05
3	**Relational Model and Relational Algebra:** Introduction to Relational Model, Relational Model Constraints and Relational Database Schemas, Concept of Keys: Primary Kay, Secondary key, Foreign Key, Mapping the ER and EER Model to the Relational Model, Introduction to Relational Algebra, Relational Algebra expressions for Unary Relational Operations, Set Theory operations, Binary Relational operation, Relational Algebra Queries.	05

4	**Structured Query Language (SQL):** Overview of SQL, Data Definition Commands, Set operations, aggregate function, null values, Data Manipulation commands, Data Control commands, Views in SQL, Complex Retrieval Queries using Group by, Recursive Queries, nested Queries; Referential integrity in SQL. Event Condition Action (ECA) model (Triggers) in SQL; Database Programming with JDBC, Security and authorization in SQL, Functions and Procedures in SQL and cursors, Query Optimization.	**10**
5	**Relational–Database Design:** Design guidelines for relational schema, Functional Dependencies, Definition of Normal Forms- 1NF, 2NF, 3NF, BCNF, Converting Relational Schema to higher normal forms.	**06**
6	**Transaction Management and Recovery:** Transaction Concept, ACID properties, Transaction States, Implementation of atomicity and durability, Concurrent Executions, Serializability, Concurrency Control Protocols: Lock-based, Timestamp based, Validation Based, Deadlock Handling, Recovery System: Failure classification, Log based recovery, Shadow Paging, ARIES recovery algorithm.	**09**
7	**Indexing Mechanism:** Hashing Techniques; Types of Indexes: Single Level Ordered Indexes; Multilevel Indexes; Overview of B-Trees and B+-Trees.	**04**

List of Laboratory Experiments:

1. To draw an ER diagram for a problem statement.
2. To implement Basic SQL commands.
3. To access & modify Data using SQL.
4. To implement Joins and Views.
5. To implement Subqueries.
6. To implement Integrity Constraints.
7. To implement triggers.
8. To implement procedures, functions and cursors.
9. To simulate ARIES recovery algorithm.
10. To demonstrate export-import commands.
11. To implement B-trees/B+ trees.
12. Mini Project: To design and implement a fully-fledged database.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text books:

1. Korth, Slberchatz, Sudarshan, “Database System Concepts”, 7th Edition, McGraw – Hill, 2019
2. Elmasri and Navathe, “Fundamentals of Database Systems”, 7th Edition, PEARSON Education, 2016.
3. G. K. Gupta: “Database Management Systems”, 3rd Edition, McGraw – Hill, 2018.
4. Raghu Ramkrishnan and Johannes Gehrke, “Database Management Systems”, 3rd Edition, McGraw – Hill, 2014.

Reference Books:

1. Sharnam Shah, “Oracle for Professional”, SPD, 2008.
2. Dr. P.S. Deshpande, “SQL and PL/SQL for Oracle 11g Black Book”, Dreamtech Press, 2012.
3. Patrick Dalton, “Microsoft SQL Server Black Book”, Coriolis Group,U.S., 1997
4. Inc. Kogent Learning, “SQL Server 2012 Black Book”, Dreamtech Press.
5. Lynn Beighley, “Head First SQL”, O'Reilly Media, 2007.

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.

Laboratory:

1. Oral and practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test. Total duration allotted for writing each of the paper is 1 hr.
2. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Term Work shall consist of at least 10 practical's based on the above list.

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

i Laboratory work (Performance of Experiments, Write-up): 15 marks

ii Assignment and Mini Project: 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 Head of the Department Principal

Program: Second Year Information Technology	Semester: III
Course: Digital Logic Design	Course Code: DJ19ITC304
Course: Digital Logic Design Lab	Course Code: DJ19ITL304

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	25	15	10	25	

Pre-requisite: Knowledge of Basic Electrical Engineering.

Course Objectives: The aim of the course is to provide a comprehensive introduction to digital circuit design. The course familiarizes students to number system representations, binary codes, binary arithmetic and boolean algebra, its axioms and theorems, and its relevance to digital logic design. The student will analyze and design combinational and sequential circuits for implementing various digital circuits which helps them to comprehend the processor organization and develop simple programs in 8086 microprocessor.

Course Outcomes: On successful completion of this course, student should be able to:

1. Perform inter-conversion between various types of codes and number systems useful in digital communication and computer systems.
2. Implement combinational circuits by using the appropriate techniques.
3. Implement sequential circuits by using the appropriate techniques.
4. Develop assembly language programs for 8086 microprocessor.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Number System and codes**: Introduction to number systems, binary number systems, Signed binary numbers, octal, decimal and hexadecimal number systems and their conversion, binary arithmetic using compliments, binary subtraction using 1's and 2's complements, codes and their classification, gray code, BCD code, excess-3 code, inter-conversion of codes.	06
2	**Boolean Algebra and Logic gates:** Introduction to Boolean algebra, logic gates and their truth tables: NOT, AND, OR, NAND and NOR operations, exclusive –OR and exclusive –NOR operations, Boolean algebra theorems and properties, standard SOP and POS form, Reduction of Boolean functions using algebraic method, K -map method (2, 3, 4 Variable), Quine Mc-Cluskey minimization technique, Realization of switching functions, universality of NAND and NOR gate,	09

	NAND-NAND implementation, NOR-NOR implementation.	
3	**Analysis and Design of Combinational Circuits:** Introduction to combinational circuits, half adder and full adder, half subtractor and full subtractor, n-bit parallel adder and subtractor, look ahead – carry adder, four-bit binary adder, 1-digit BCD Adder, Binary comparator (2,3 variable), 4-bit Magnitude Comparator IC 7485, multiplexers and de-multiplexers, multiplexer and de-multiplexer tree, encoder and decoder.	**09**
4	**Design of Sequential circuit:** Introduction to sequential circuits, Flip Flops: SR, JK, D, T, master slave flip flop, truth table, excitation table and conversion, Registers: Shift register, SISO, SIPO, PISO, PIPO, bi-directional and universal shift register IC 74194, Counters: Design of synchronous and asynchronous, modulo counter, up down counter IC 74193.	**09**
5	**Processor Organization:** CPU Architecture, register organization, introduction to buses, instruction word formats, addressing techniques, ISA categories: Complex Instruction Set Computing features, Reduced Instruction Set Computing features. Introduction to Intel 8086 Architecture: Bus interface unit, execution unit, instruction set and instruction format, data addressing modes, Working of MOV, ADD, SUB, MUL, DIV, CMP, IMC, DEC, NEG, AND, OR, NOT, XOR instructions.	**09**

List of Laboratory Experiments: (Any 10 to 12)

1. To study logic gates & universal gates and verify their truth tables.
2. i) To verify the logical expression using truth table.
   ii) To implement basic gates using universal gates
3. Implement full adder and full subtractor using logic gates and verify their truth tables.
4. To study and implement 4-bit magnitude comparator using IC 7485 and verify its truth table.
5. i) Implement the functions using 8:1 Multiplexer with the help of IC 74151
   ii) Implement 1:8 De-multiplexer using IC 74138.
6. i) Implement 8:3 octal to binary code converter using encoder IC 74148
   ii) Implement full adder using 3:8 decoder IC 74138
7. i) Implement JK Flip Flop using only NAND gates and verify its truth table.
   ii) Verify the same flip flop using IC 7476.
8. To study and implement S-R Flip Flop using IC 7400 and verify its truth table.
9. Implement conversion of one Flip Flop to another.
10. To study and verify the following functions of Universal Shift Register IC 74194
    i) Parallel loading
    ii) Right shift
    iii) Left shift
11. To study and stimulate CPU Design.
12. To implement simple programs in 8086 microprocessor.
13. Case Study on multi-core Processors.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text books:

1. R. P. Jain, “Modern Digital Electronics”, Tata McGraw Hill 4th Edition, 2009.
2. M. Morris Mano, “Digital Logic and computer Design”, PHI 4th Edition 2010.
3. Balbaniam, Carison, “Digital Logic Design Principles”, Wiley Publication 3rd Edition, 2000.

4. Holdsworth and R. C. Woods, “Digital Logic Design”, 4thEdition, Newnes, 2002.
5. William I. Fletcher, “An Engineering Approach to Digital Design”, 1st Edition, PHI, 2009.
6. Carl Hamacher, ZvonkoVranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw-Hill, 2011.
7. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Pearson,10th Edition, 2013.
8. Sunil Mathur, “Microprocessor 8086 – Architecture, Programming and Interfacing”, Prentice Hall India (PHI), 2010.

Reference Books:

1. Martin S. Roden, Gordon L. Carpenter, William R. Wieserman “Electronic Design-From Concept to Reality”, Shroff Publishers and Distributors, 4th Edition, 2002.
2. Anand Kumar, “Fundamentals of Digital Circuits”, Prentice Hall India, 4th Edition, 2003.
3. SubrataGhosal, “Digital Electronics”, Cengage Learning, 5th Edition 2012.
4. Anil K. Maini, “Digital Electronics Principles and Integrated Circuits”, Wiley India, 3rd Edition, 2007.
5. Donald P Leach, Albert Paul Malvino, “Digital Principles and Applications”, Tata McGraw Hill, 2010.

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.

Laboratory:

1. Oral and practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Laboratory: (Term work)

Term Work shall consist of at least 10 practical’s based on the above list.

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

i Laboratory work (Performance of Experiments): 15 marks

ii Journal Documentation (Write-up, 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 Head of the Department Principal

Program: Second Year Information Technology	Semester: III
Course: Operating System	Course Code: DJ19ITC305
Course: Operating System Laboratory	Course Code: DJ19ITL305

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	presentation/ assignments/ quiz		
				--	--	25	15	10	25	

Pre-requisite: Knowledge of-

1. Programming Language C.
2. Basic of Hardware i.e. ALU, RAM, ROM, HDD etc.

Course Objectives: The objective of this course is to familiarize students with the functionality of an Operating System, its basic components & interaction among them. To expose students to analyze and evaluate different policies for scheduling, deadlocks, memory management, synchronization, system calls, file systems & I/O and implement these policies using a suitable programming language.

Couse Outcomes: On successful completion of this course, student should be able to:

1. Analyze and evaluate the performance of different process and disk scheduling algorithms.
2. Demonstrate inter-process communication and process synchronization.
3. Analyze and evaluate various deadlock detection, avoidance and removal techniques.
4. Analyze and evaluate memory management policies in different scenarios.
5. Evaluate different file organization and access techniques

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Overview of Operating System** **Introduction:** Operating System operations, Process management, Memory management, storage management, Protection and security, Distributed and special purpose Systems. **System Structure:** Operating system services and interface, System calls and its types, System programs, Operating System Design and implementation, OS structure, Virtual machines, OS debugging and generation, System boot.	05

2	**Process Management** **Process concept:** Process Scheduling, Operation on process and Inter process communication. **Multithreaded Programming:** Multithreading models and thread libraries, threading issues. **Process Scheduling:** Basic concepts, Scheduling algorithms and Criteria, thread scheduling.	**08**
3	**Process coordination** **Synchronization:** The critical Section Problem, Peterson's Solution, synchronization Hardware and semaphores, Classic problems of synchronization, monitors. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.	**08**
4	**Memory Management** **Memory Management strategies:** Swapping, Contiguous Memory Allocation, Paging, Segmentation. **Virtual Memory Management:** Demand Paging, Page Replacement, Allocation of Frames, Thrashing.	**08**
5	**Storage Management** **File System:** File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection. **Implementing file System:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free- Space Management **Secondary Storage Structure:** Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management; RAID Structure.	**08**
6	**I/O Systems** Overview I/0 Hardware, Application I/0 Interface, overview of system protection	**05**

List of Laboratory Experiments:

1. Installation of Linux
2. Study of Linux general purpose commands
3. Basic System administrative task: Process management, Memory management, File system management, User management
4. Shell scripts and sed (Stream Editor)
5. Implementation of Scheduling algorithms (FIFO, SJF, Priority, Round Robin)
6. Implementation of classic Synchronization problems using semaphores (producer-consumer, reader-writer, dining philosophers)
7. Implementation of Bankers Problem (Deadlock avoidance)
8. Implementation of Memory management/ allocation policies (1^{st} fit, best fit, worst fit)
9. Implementation of Page replacement algorithms (FIFO, LRU, OPTIMAL)
10. Implementation of Disk scheduling algorithms (FCFS, SSTF, SCAN, CSCAN, LOOK)
11. Implementation of file allocation strategies (Sequential, Indexed, Linked)
12. Implementation of the following file organization techniques (Single level directory, Two level directory, Hierarchical)
13. Case study on comparison of various Operating Systems based on parameters such as process management, memory management, I/O management, etc.

Books Recommended:

Textbooks:

1. Abraham Silberschatz, Greg Gagne, Peter Baer Galvin, "Operating System Concepts", 8th Edition, Wiley, January 2018.

2. Tanenbaum, “Modern Operating System”, 4th Edition, Pearson Education, 2014.
3. William Stallings, “Operating Systems: Internal and Design Principles”, 8th Edition, Pearson, 2014.
4. Randal. K. Michael, “Mastering Shell Scripting”, 2nd Edition, Wiley Publication, 2008.

Reference Books:

1. A Tanenbaum, “Operating System Design and Implementation”, 3rd Edition, Pearson, January 2015.
2. Phillip A. Laplante, Seppo J. Ovaska , “Real Time Systems Design and Analysis”, 4th Edition, Wiley-IEEE Press, Dec 2011.
3. Naresh Chauhan, “Principles of Operating Systems”, Oxford University Press; 1st Edition, 2014.

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.

Laboratory:

1. Practical and oral examination will be based on the entire syllabus including, the practical’s performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Consisting of Two Compulsory Class Tests: Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of at least 10 experiments based on the above list.

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

i Laboratory work (Performance of Experiments, Write-up): 15 marks

ii Presentation/ Quiz/ 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 Head of the Department Principal

Program: Second Year Information Technology										Semester: III	
Course: Programming Laboratory 1 (Java and Advanced Java)										Course Code: DJ19ITL306	
Teaching Scheme (Hours / week)				Evaluation Scheme							
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)				Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2		Avg.	
				--			--	--		--	--
				Laboratory Examination			Term work			Total Term work	100
--	2+2*	--	2	Oral	Practical	Oral & Practical	Laboratory Work	Mini project / presentation/ assignment/Quiz			
				--	--	50	15	35		50	

*2 hours' theory to be conducted.

Pre-requisite: Knowledge of -

1. Programming Language C.

Course Objectives: The objective of this course is to make students familiar with basic, Object Oriented features of JAVA and SOLID principles. To expose students to analyse a problem statement, develop suitable logic and implement it in JAVA. To enable students to design and develop GUI applications.

Course Outcomes: On successful completion of this course, student should be able to:

1. Develop applications by applying SOLID principles as well as appropriate Object Oriented concepts and APIs.
2. Debug a given code, rectify the errors to get the desired output.
3. Make suitable modifications to programs as per user requirements for solving real world problems.
4. Develop GUI applications using modern APIs (JAVAFX, swings, etc.)
5. Work effectively as a member of a team.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Fundamental of Java Programming** Overview of procedure and object-oriented Programming, Java Designing Goals, Features of Java Language. Introduction to the principles of object-oriented programming: Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism, SOLID principles for designing Keywords, Data types, Variables, Operators, Expressions, Types of variables and methods. Control Statements: If Statement, If-else, Nested if, switch Statement, break, continue. Iteration Statements: for loop, while loop, and do-while loop. Arrays: One Dimensional arrays, Two-Dimensional array, Irregular arrays Wrapper classes, Java.util.Scanner, Java. io.BufferedReader, Java.io.DataInputStream, Java.io.DataOutputStream, Command-Line Arguments and String Buffer classes and String functions.	14

2	**Classes, Objects and Array of Object** Classes & Objects: Class Fundamentals: Assigning Object Reference Variables, passing parameters to Methods and Returning parameters from the methods, pass by value, reference, static and non-static members Nested and Inner Classes, Recursion, finalize (), Method overloading Constructors: Parameterized Constructors, copy constructor, default, non-parameterized, Constructors overloading.	**10**
3	**Inheritance, Interface and Packages** Inheritance Basics, Types of Inheritance in Java, Concept of Super and sub class, inheriting Data members and Methods, Role of Constructors in inheritance, making methods and classes final, Method overriding, Dynamic Method Dispatch (static and dynamic polymorphism), Abstract classes and methods. Defining an interface, extending interfaces, implementing interfaces, accessing implementations through interface references, Interfaces vs. Abstract classes. Packages – Steps for defining, creating and accessing a Package, importing packages, Making JAR Files for Library Packages, java.util.Vector.	**08**
4	**Exception Handling and Multithreading** Exception handling Mechanism: try, catch, throw, throws and finally, user defined exceptions Multithreading: Need of Multithreading, Java thread Model, thread Lifecycle, thread class Methods, Implementing Runnable, extending thread, Synchronizing threads, synchronized Statement, Critical Factor in Thread –Deadlock.	**06**
5	**Java Swings** Introducing Swing: AWT vs Swings, Components and Containers, Swing Packages, A Simple Swing Application, Painting in Swing, Designing Swing GUI Application using Buttons, JLabels, Checkboxes, Radio Buttons, JScrollPane, JList, JComboBox, Trees, Tables Scroll pane Menus and Toolbars.	**06**
6	**Java Collections** Collections in Java, basic data structures, arrays and lists, stacks and queues, sets and maps.	**06**
7	**Generics** Basic generics, bounded type parameters, type inference, wildcards, type erasure.	**06**

List of Laboratory Experiments:

1. Write java programs to understand Expressions, Variables, Basic Math operations.
2. Write java programs to demonstrate different decision-making statements
3. Write java program to demonstrate input output using command line arguments, buffered reader and data input stream reader
4. Write a java program to implement Arrays (1D, 2D, irregular).
5. Write a java program to implement Basic String Operations & String Methods.
6. Write a java program to implement Functions, Recursion.
7. Write java programs to demonstrate classes, objects, array of objects
8. Write java programs to demonstrate call by value and call by reference
9. Write java programs to demonstrate static non static members, nested and inner classes.
10. Write java programs to demonstrate different Object-oriented features: a) Classes & objects b) Constructors c) Inheritance & Polymorphism.
11. Write java programs to demonstrate the concept of abstract classes and interfaces.
12. Write java programs to import inbuilt packages as well as create and import user defined packages.
13. Write java programs to handle exceptions using Exception Handling Mechanism.

14. Write java programs to implement multithreading
15. Write java programs to understand GUI designing and database operations (Programs based on GUI designing using swings/ modern APIs)
16. Write java programs to understand java collections
17. Write java program to implement generics.

Books Recommended:

Textbook Books:

1. Herbert Schildt, "Java-The Complete Reference", 11th Edition, Tata McGraw Hill Publication, 2018.
2. E. Balguruswamy, "Programming with Java: A Primer", Fifth edition, Tata McGraw Hill Publication, 2017.

Reference Books:

1. D.T. Editorial Services, "Java 8 Programming Black Book", Dreamtech Press, 2015.
2. H. M. Deitel, P. J. Deitel, S. E. Santry, "Advanced Java 2 Platform How to Program", 2nd Edition, Prentice Hall, 2007.
3. Scrip tDemics, "Learn to Master JAVA", from Star EDU solutions, 2017.

Evaluation Scheme:

Laboratory:

Practical and oral examination will be based on the entire syllabus including, the practical's performed during laboratory sessions and guided mini project covering the relevant concepts of object oriented programming. This helps them to apply the OOP knowledge gained during classroom sessions to solve real time problems.

Laboratory: (Term work)

1. Term work shall consist of at least 10 experiments based on the above list.
2. Mini project

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

i Laboratory work (Performance of Experiments, Write-up): 15 marks

ii Mini project / presentation/ assignment/Quiz: 35 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 Head of the Department Principal

Program: Information Technology										Semester : III
Course : Innovative Product Development I										Course Code: DJ19A2
Teaching Scheme (Hours/week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	--
				Laboratory Examination			Semester review		Total	100
--	2	--	--	Oral	Practical	Oral & Practical	Review 1	Review 2		
				--	--	--	50	50	100	

Course 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 conceptualize and create a successful product.

Course Outcome:

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 conceptualizing 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 analyze 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 them 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

  In the last review of the semester IV, the marks will be awarded as follows
    - Marks awarded by the supervisor (Considering technical paper writing) 30
    - Marks awarded by the review committee 20

NOTE: A candidate needs to secure a minimum of 50 % marks to be declared to have completed the audit course.

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

- In the semester III, 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.
- In the semester IV, the expected work shall be procurement of components/systems, building of the working prototype, testing and validation of the results based on work completed in semester III.
    - First review is based on readiness of building the working prototype.
    - Second review shall be based on a presentation as well as the demonstration of the working model, during the last month of semester IV. This review will also look at the readiness of the proposed technical paper presentation of the team.

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.

The semester reviews (III and IV) may be based on relevant points listed above, as applicable.

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 organizations having an experience of more than five years, approved by the Head of the Institution. The presence of the external examiner is desirable only for the 2nd presentation in semester IV. Students are compulsorily required to present the outline of the technical paper prepared by them during the final review in semester IV.

Prepared by Checked by Head of the Department Principal

Program: Common for all Programs								Semester : III
Course : Constitution of India								Course Code: DJ19A3
Teaching Scheme (Hours/week)				Evaluation Scheme				
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	--
				Laboratory Examination			Termwork --			--
01	--	--	--	Oral	Practical	Oral & Practical				
				--	--	--				

Course 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.

Course Outcome: On successful completion of this course, student should 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.

Detailed Syllabus : (unit wise)

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.	02
2	**Directive Principles of State Policy:** Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India.	03
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.	03
4	**Special Provision**s: 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	03

5	**Scope & Aims of Engineering Ethics**: Responsibility of Engineers Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering	03

Books Recommended:

Text books:

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

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.com

Prepared by Checked by Head of the Department Principal

Program: Second Year Information Technology	Semester : IV
Course : Probability & Statistics	Course Code: DJ19ITC401
Course : Probability & Statistics Tutorial	Course Code: DJ19ITT401

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	25
3	-	1*	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				-	--	--	-	25	25	

***Batch wise tutorials are to be conducted.**

Pre-requisite: Engineering Mathematics – I and Engineering Mathematics – II

Course Objectives: The objective of this course is to inculcate an ability to relate engineering problems to mathematical context. To introduce students to the concepts of Number Theory by using different theorems. To cover the basic principles of probability, hypothesis testing and correlation between data. The course also familiarizes students with different methods of solving Linear Programming problems.

Course Outcomes: On successful completion of this course, student should be able to:

1. Apply the Number Theory in IT domain.
2. Apply Linear Programming methods to solve engineering problems.
3. Probability Distribution?
4. Perform Data Analysis using Sampling theory.
5. Identify the relationship amongst various attributes of sample data sets using suitable techniques.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Elements of Number Theory:** Modular Arithmetic, Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, Testing for primes, Prime Number Theorem Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem	10
2	**Matrices:** Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), Similar matrices, diagonalizable of matrix. Functions of square matrix	08

3	**Probability:** Baye's Theorem, Random Variables: - discrete & continuous random variables, expectation, Variance, Probability Density Function & Cumulative Density Function. Moments, Moment Generating Function. Probability distribution: binomial distribution, Poisson & normal distribution. (For detail study)	**08**
4	**Sampling Theory (Large Sample test, Small Sample test):** Sampling Distribution, Test of Hypothesis, Level of significance, Critical region, One Tailed and Two Tailed test, Test of significant for Large Samples: -Means of the samples and test of significant of means of two large samples. Test of significant for small samples: - Students t- distribution for dependent and independent samples Chi square test:- Test of goodness of fit and independence of attributes, Contingency table.	**10**
5	**Mathematical Programming:** Types of solution, Standard and Canonical form of LPP, Basic and feasible solutions, simplex method. Artificial variables, Big –M method (method of penalty). Duality, Dual simplex method. **Correlation & regression, Curve Fitting (Flipped Classroom):** Scattered diagrams, Karl Pearson's coefficient of correlation, covariance, Spearman's Rank correlation (non-repeated and repeated ranks) Regression coefficient & Lines of Regression.	**06**

List of Tutorials:

1. Number Theory
2. Eigenvalues and Eigenvectors of Matrices
3. Probability, Discrete Random Variable, Continuous Random Variable, Moment Generating function.
4. Binomial Distribution, Poisson Distribution
5. Normal Distribution
6. Large Sample Test
7. Small Sample Test, Chi Square Test
8. LPP Simplex Method, Big M Method, Dual Simplex Method
9. Correlation
10. Regression

Books Recommended:

Text books:

1. B. S. Grewal, "Higher Engineering Mathematics", 40th edition, Khanna Publication 2010.
2. Dr. J Ravichandran, "Probability and Statistics for Engineering", Wiley-India, 2019.
3. H. C Saxena, "Mathematical Statistics", S. Chand & Co, 2010.
4. P. N. Wartikar & J. N. Wartikar, "A Text Book of Applied Mathematics Vol. I & II", Vidyarthi Griha Prakashan, Pune, 2014

Reference Books:

1. Kenneth H. Rosen, "Elementary Number Theory and its Applications", 6th edition, Addison Wesley Publication, 2010.
2. Seymour Lipschutz, "Probability", Indian Edition, McGraw-Hill publication, 2017.
3. S.D. Sharma Kedar Nath, Ram Nath & Co, "Operations Research", Meerat, 2012.
4. Singiresu S.Rao, "Engineering optimization (Theory and Practice)", New Age International publication, 2013.
5. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 2003.

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.

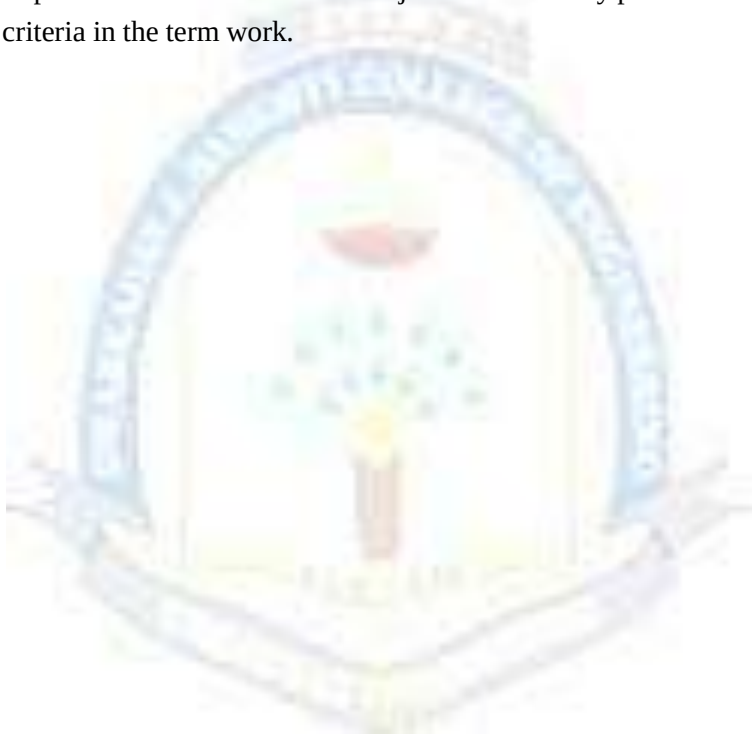
Tutorial: (Term work)

Term work shall consist of minimum 8 Tutorials covering the entire modules.

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

Tutorial– 25 marks

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



Prepared by Checked by Head of the Department Principal

Program: Second Year Information Technology Engineering	Semester : IV
Course : Formal Languages and Automata Theory	Course Code: DJ19ITC402
Course : Formal Languages and Automata Theory Tutorial	Course Code: DJ19ITL402

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	25
3	--	1*	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	--	--	25	25	

***Batch wise tutorials are to be conducted.**

Pre-requisite: Knowledge of -

1. Basic Mathematical Fundamentals: Sets, Logic, Relations, Functions.

Course Objectives: The objective of the course is to introduce students to the mathematical foundations of computability theory including automata theory & it's applications; the theory of formal languages and grammars; the notions of decidability and computability. The course also enables students to develop the ability to design formal grammar & abstract computing models for formal languages and appreciate the power and limitations of these models.

Course Outcomes: On successful completion of this course, student should be able to:

1. Design formal grammar.
2. Design computational model.
3. Apply rigorously formal mathematical methods to prove properties of formal languages.
4. Prove that the certain languages are undecidable.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Formal Languages:** Introduction, Chomsky Hierarchy. **Regular Language:** Basic Definition, alphabets and strings. **Regular Expression (RE):** Definition, RE operators, operation on regular language such as concatenation, closure, union, interaction, etc. Construction of RE for Regular Language, Pumping lemma for regular language, closure properties of regular language. **Regular Grammar:** Definition, notations, grammar constituents, Left and Right Linear grammar, construction of LL & RL grammar, equivalence of regular grammar and finite automata.	06

2	**Finite Automata (FA):** Basic definition, representation, FA as a language acceptor and verifier, different models such as Deterministic FA (DFA) and Non-deterministic FA (NFA). **DFA:** Formal definition, construction of DFA. **NFA:** Formal definition, construction of NFA. Equivalence of DFA's and NFA's **NFA with ∈-moves:** Formal definition, ∈-CLOSURE of a state, construction of NFA with ∈-moves. Equivalence of NFA's with and without ∈-moves, Equivalence of NFA's with ∈-moves and DFA, Construction of NFA with ∈-moves for RE and Construction of RE from FA. Minimal State Finite Automata: necessity and advantages of minimization, minimization algorithm. **Finite Automata with output:** Basic concept, advantages, different models such as Moore and Mealy machines. Moore m/c: formal definition, construction of different Moore m/c models. Mealy m/c: formal definition, construction of Mealy m/c models (examples). Equivalence of Moore and Mealy m/c. Applications of finite automata: lexical analyzer, text editor.	**10**
3	**Context Free Language (CFL) & Context Free Grammar (CFG):** Definition, notations, construction of CFG for CFL. **Derivation:** left most derivation, right most derivation, derivation tree, ambiguous context free grammar, and removal of ambiguity from CFG. **Simplification of CFG:** live variable, reachable variable, useful variable, useful and useless production, removal of useless variables and useless productions, Nullable variable, ∈-production, removal of ∈-productions, unit production, removal of unit productions. Normal Forms: Chomsky normal form, Greibach normal forms.	**08**
4	**Push Down Automata (PDA):** Formal definition, instantaneous description, accepted languages, deterministic and non-deterministic PDA, construction of PDA for CFG and CFL, construction of CFG for PDA.	**06**
5	**Turing Machine (TM):** Formal definition, instantaneous description, construction of TM. Variations of Turing machine: Two way infinite tapes, Multi-tape, Multiple tracks, Non-deterministic, multidimensional, Multi-head. Church-Turing thesis.	**08**
6	**Undecidability:** Decidable and undecidable problem. Recursive and recursively enumerable language: definition, properties. Universal Turing Machine (UTM) and an undecidable problem. A non-recursive enumerable language, halting problems, other unsolvable problems about TM. Post's correspondence problems: An instance of PCP, modified version of PCP, Undecidability of PCP, applications of PCP.	**04**

List of Tutorials:

1. Designing RE, RG, RLG and LLG for given Regular Language.
2. Converting RE to NFA, NFA to DFA to Reduced DFA, FA to RE.
3. Designing Moore and Mealy machines.
4. Designing CFG and getting Leftmost and Rightmost derivations from it.
5. Simplification of CFG
6. Converting CFG to CNF & GNF.
7. Designing Push Down Automata for CFL and CFG.
8. Getting CFG from PDA

9. Designing Turing Machine.
10. Demonstration of JFLAP tool.

Books Recommended:

Text books:

1. John C. Martin, "Introduction to Languages and Theory of Computation", 4th Edition, Tata McGraw Hill, 2011.
2. Kavi Mahesh, "Theory of Computation A Problem Solving Approach", 1st Edition, Wiley India, 2011.

Reference Books:

1. John E. Hopcroft, Jeffrey D. Ullman, Motwani, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson, 2007.
2. Peter Linz, "An Introduction to Formal Languages and Automata", 3rd Edition, Jones and Bartlett Learning, 2001.
3. Harry R. Lewis, Christos H. Papadimitriou, "Elements of the Theory of Computation", 2nd Edition, PHI, 1998.
4. Michael Sipser, "Introduction to the Theory of Computation", 2nd Edition, Thomson Learning, 2006.
5. Bernard M. Moret, "The Theory of Computation", 1st Edition, Pearson Education, 2002.
6. Daniel I. A. Cohen, "Introduction to Computer Theory", 2nd Edition, Wiley, 2014.
7. J. Richard Buchi, "Finite Automata, Their Algebras and Grammars: Towards a Theory of Formal Expressions", 1st Edition, Springer-Verlag, 1989.
8. McNaughton R, "Elementary Computability, Formal Languages and Automata", Prentice-Hall, 1982.
9. K. L. P. Mishra, N. Chandrasekaran, "Theory of Computer Science", 3rd Edition, PHI, 2008.

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. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
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.

Tutorial: (Term work)

Term work shall consist of minimum 12 - 15 tutorials and based on the syllabus.

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

Tutorial– 25 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 Head of the Department Principal

Program: Second Year Information Technology Engineering	Semester : IV
Course : Design and Analysis of Algorithms	Course Code: DJ19ITC403
Course : Design and Analysis of Algorithms Laboratory	Course Code: DJ19ITL403

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	25	15	10	25	

Pre-requisite: Knowledge of -

1. Data Structures and Algorithms
2. Any Programming Language (C or Java)

Course Objectives: The objective of the course is to introduce important algorithmic design paradigms and approaches for effective problem solving in computing and how to use these paradigms efficiently to solve a given problem. To analyse the algorithm for its efficiency to show its effectiveness over the others. In addition, the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems will be introduced.

Course Outcomes: On successful completion of this course, student should be able to:

1. Analyze the performance of algorithms using asymptotic analysis.
2. Solve the problem using appropriate algorithmic design techniques.
3. Able to prove that certain problems are NP-Complete.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Introduction to Algorithms Analysis:** Need for Algorithmic thinking, Classification of Algorithms, Asymptotic analysis. Recurrence Relations and Solving Recurrences using different methods.	04
2	**Divide & Conquer:** Introduction, Recurrence equation for divide and conquer, Finding the maximum & minimum, Merge sort, Quicksort, multiplication of Long Integers, Strassen's matrix multiplication, analysis of all algorithms.	06
3	**The Greedy Method:** Introduction, Control abstraction, Optimal storage of tapes, Knapsack problem, Job Scheduling problems, Optimal merge patterns, Huffman Code, Tree vertex splitting problem, Minimum cost spanning trees, Prims's & Kruskal's method, Single source shortest paths, Subset cover problem, Container loading problem, Coin changing problem, Analysis of all algorithms.	08

4	**Dynamic Programming:** Introduction, Components of dynamic programming, characteristics of dynamic programming, Fibonacci problem, Computing binomial coefficients, Coin Changing	**10**
	problem, Multistage graphs, All pairs shortest paths (Floyd Warshall Algorithm), Bellman-Ford Algorithm, Matrix Chain Multiplication, Optimal binary search tree (OBST), 0/1-Knapsack, Reliability design, Travelling salesperson problem, Flow shop scheduling, Longest Common Subsequence (LCS), analysis of all algorithms.	
5	**Backtracking:** Introduction, Basics of backtracking, N–queen problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem, Generating permutation, Analysis of all algorithms.	**06**
6	**Branch-and-Bound:** Introduction, LC-search - Control abstraction, Properties, Least-cost answer node, 15-puzzle problem, FIFO branch and bound algorithm for job sequencing problem, LC Branch-and-bound, LC branch and bound to find minimum cost answer node, 0/1-Knapsack problem, LC branch and bound algorithm for knapsack problem, FIFO branch and bound solution, reduction algorithm for knapsack problem, Traveling salesperson problem.	**06**
7	**Basics of Computational Complexity:** Introduction, Non-deterministic polynomial time algorithms, Complexity classes, Polynomial time verification, NP Completeness, Reduction, and Examples for NP Completeness proofs.	**04**

Suggested List of Laboratory Experiments: (Any 10 to 12)

1. Implementations of Quick Sort and Merge Sort.
2. Implementations of Knapsack problem.
3. Implementations of Job Sequencing with deadlines.
4. Implementation of Prims's & Kruskal's method.
5. Implementation of Shortest paths algorithms (Dijkstra's algorithm and Bellman-ford algorithm).
6. Implementation of Multistage graphs (Forward and Backward) algorithm.
7. Implementation of Floyd Warshall Algorithm.
8. Implementation of Matrix Chain Multiplication.
9. Implementation of Optimal binary search tree.
10. Implementation of 0/1-Knapsack.
11. Implementation of Travelling salesperson problem.
12. Implementation of Johnson's Algorithm for 2 machines and 3 machines scenarios.
13. Implementation of Longest Common Subsequence (LCS).
14. Implementation of 8 queen problem.
15. Implementation of Sum of subsets.
16. Implementation of 15 puzzle problem
17. Implementation of Graph coloring
18. Implementation of Travelling salesperson problem using branch and bound.
19. Implementation of 0/1-Knapsack using branch and bound

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text books:

1. S. Sridhar, Design and Analysis of Algorithms, 1st Edition, Oxford Education, 2018.
2. Ellis Horowitz, and Sartaj Sahni, Fundamentals of Computer Algorithms, 2nd Edition, Galgotia, 2012.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to Algorithms", 3rd Edition, The MIT Press, 2009.
2. Aho, Hopcroft, Ullman, "Design and analysis of Algorithm", 1st Edition, Addison-Wesley, 2000.
3. David Harel, "Algorithmics-The spirit of computing", 3rd Edition, Addison-Wesley, 2004.
4. Knuth, "Fundamentals of Algorithms", 3rd Edition, Narosa Publication, 1998.
5. Herbert S. Wilf, "Algorithms and Complexity", 2nd Edition, PHI, 2002.
6. S. E. Goodman and S. T. Hedetniemi, "Introduction to the Design and Analysis of Algorithms", McGraw Hill, 1988.
7. Sara Baase, Allen Van Gelder, "Computer Algorithms Introduction to Design and Analysis", 3rd Edition, Addison-Wesley, 2000.
8. Gilles Brassard, Paul Bratley, "Fundamentals of Algorithmics", 4th Edition, PHI, 2000.
9. Harsh Bhasin, "Algorithms: Design and Analysis", 1st Edition, Oxford, 2015.
10. Kleinberg and Tardos, "Algorithm Design", 1st Edition, Addison-Wesley, 2006.

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.

Laboratory:

Oral & Practical examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
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)

Term work shall consist of minimum 10 - 12 experiments and minimum 2 assignments.

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 Head of the Department Principal

Program: Second Year Information Technology	Semester : IV
Course : Computer Networks	Course Code: DJ19ITC404
Course : Computer Networks Laboratory	Course Code: DJ19ITL404

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Assignment/ Mini project		
				--	--	25	15	10	25	

Pre-requisite: Computer System Basics

Course Objectives: The objective of the course is to introduce the students to the layered approach in communication network. This course aims to provide the students with an introduction to standard client-server based applications. The course will also enable the students to explore the services and protocols of each layer and choose appropriate protocols while sending data from sender to receiver using guided or unguided transmission media.

Course Outcomes: On successful completion of this course, student should be able to:

1. Explain the role of each layer of the OSI and TCP/IP models.
2. Explore the standard client server applications of the application layer.
3. Implement Transport Layer protocols.
4. Implement appropriate routing algorithms for network-layer packet delivery.
5. Explore the data link layer services & multiple access techniques
6. Classify various transmission media.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Introduction:** Network devices, Network Types: LAN, MAN, WAN, Network topology, OSI Reference model, TCP/IP suite, Comparison of OSI and TCP/IP.	03
2	**Application Layer:** Introduction: Providing Services, Application layer Paradigms, Client-Server Paradigm: Application Programming Interface, Using Services of the Transport Layer, Standard Client Server applications: World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS).	06
3	**Transport Layer:** Transport Layer Protocols: Simple Protocol, Stop-and-Wait Protocol, Go-Back-N Protocol (GBN), Selective-Repeat Protocol, Bidirectional Protocols: Piggybacking, User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control	10

	Protocol: TCP Services, TCP Features, TCP Segment, A TCP Connection, Flow Control, Error Control, TCP Congestion Control, TCP Timers.	
4	**Network Layer:** Introduction: Network-Layer Services, Packet Switching, Network Layer Protocols: IPv4 Datagram Format, IPv4 Addresses, Subnetting, Supernetting, Forwarding of IP Packets, ICMPv4, Routing algorithms: Shortest Path (Dijkastra's, Bellmanford Algorithm), Distance Vector Routing (RIP), Link state routing (OSPF), BGP, QoS, Network Layer Congestion, IPv6 packet format, Transition from IPv4 to IPv6.	**11**
5	**Data Link Layer:** Two Types of Links, Data Link Control: Framing, Flow and Error Control, Error Detection and Correction ((Hamming Code, CRC, Checksum), Two DLC Protocols: HDLC, PPP, Medium Access Protocols: Random Access, Controlled Access, Wired LANS: Ethernet Protocol; IEEE Project 802, Standard Ethernet, Fast Ethernet (100 Mbps), Gigabit Ethernet, 10-Gigabit Ethernet, Virtual LANs, ARP and RARP.	**10**
6	**Physical Layer:** Transmission Media: Guided Media- Twisted pair, Coaxial, Fiber optics, Unguided Media (Wireless): Radio Waves, Microwave, Bluetooth and Infrared.	**02**

List of Laboratory Experiments:

1. To study basic networking commands like ping, tracert, nslookup, netstat, ARP, RARP, ipconfig, ifconfig, dig, traceroute, nslookup, netstat.
2. Implementation of Specific Network topology with respect to Number of nodes and physical layer configuration
3. To implement Graphical simulation of network with Routing Protocols and traffic consideration (TCP, UDP) using NAM.
4. To install Wireshark and study the packet headers.
5. Implementation of connection oriented client server programming using TCP.
6. Implementation of connectionless client server programming using UDP.
7. Implementation of socket programming to demonstrate fault tolerance.
8. Implementation of Routing Protocol
9. Implementation of Stop and Wait protocol.
10. CRC / Hamming code implementation.
11. Mini Project: A case study to design and configure any organization network eg. College network or campus network, using any packet tracer or network topology design software based on infrastructure requirements, servers and clients, traffic consideration and application requirements.

Any other experiment based on syllabus may be included, which would help the learner to understand topic/concept.

Books Recommended:

Text books:

1. Behrouz A. Forouzan, Forouzan Mosharrat, "Computer Networks A Top down Approach", McGraw Hill education, 2011.
2. Andrew S Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2013.

Reference Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill, 2013.
2. James F. Kurose, K. W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 7th Edition, Pearson Education, 2017.
3. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach, 4th Edition, Elsevier India.
4. Mayank Dave, "Computer Networks", Cengage Learning, 2012.

5. Achyut Godbole, Atul Kahate, “Data Communications and Networks”, McGraw Hill, 2011.

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.

Laboratory:

1. Oral examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
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)

Term Work shall consist of at least 10 practical’s based on the above list.

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

i. Laboratory work (Performance of Experiments, Write-up): 15 marks
ii. Assignment and Mini Project: 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 Head of the Department Principal

Program: Second Year Information Technology	Semester: IV
Course: Web Programming	Course Code: DJ19ITC405
Course: Web Programming Laboratory	Course Code: DJ19ITL405

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				75			25	25	25	100
				Laboratory Examination			Term work		Total Term work	50
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	--	25	15	10	25	

Pre-requisite: Knowledge of

1. Basics of how internet works.

Course Objective: As internet plays an important role in our daily life, it becomes essential to understand the - significance of various protocols, methods and means that are used for website development. This course aims to provide students with an introduction to client and server based Web scripting and dynamic Web application development. The students will acquire knowledge and skills for creation of a responsive website by developing interactive user interfaces that supports partial web page loading, data validation, processing of client-side data structures, data exchange languages and database access.

Course Outcomes: On successful completion of this course, student should be able to:

1. Develop web applications.
2. Test the web applications.
3. Validate web applications for conformance to latest W3C markup and accessibility standards.
4. Work effectively as a member of a team.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
1	**Introduction to web technologies:** Web system architecture- 1,2,3 and n tier architecture, URL, domain name system, overview of HTTP and FTP, Cross browser compatibility issues, W3C Validators. Web Site Design Issues: Planning a Web Site – Objective and Goals, Audience, Organizing contents, Publishing of Web Site. Function of Web Server.	02
2	**Static web page design – HTML and HTML5:** Syntax and structure of HTML document, Formatting and Fonts, Anchors, Hyperlinks, Backgrounds, Images, Lists, Tables and Forms. HTML5 Semantic elements, Form elements, Media elements, Graphics elements, Input types, Geo-location.	06
3	**Static web page design – CSS and CSS3:** Syntax of CSS, Selectors – Element, Id, Class, Pseudo-class, Universal, Inserting CSS in an HTML, Defining inheritance in CSS. CSS3 Properties –	07

	Comments, Background, Color, Text, Fonts, Icons, Borders, Margins, Padding, Outline, Height/ Width, Links, Lists, Tables, Display, Overflow, Float, Inline-block, Opacity, Position, Navigation bar, Dropdowns, Transitions, Animations, Transformations, Gradients. Responsive web design using Media Queries - Supporting Differing Viewports, Embracing Fluid Layout.	
4	**Client side scripting – JavaScript:** Lexical structure – character set, whitespaces, line breaks, comments, identifiers, reserved words, Inserting JavaScript in HTML, Variables and their scope, Control structures, Functions, Objects in JavaScript - Built in, Browser objects and DOM objects, event handling, form validation and cookies.	**07**
5	**React JS:** Introduction to React, Adding React to HTML page, Introducing JSX, Rendering elements into DOM, Components and Props, State and lifecycle of React component, Handling events with React elements, Conditional rendering, Lists and Keys, Forms, Lifting state up, Create React application.	**09**
6	**Server side scripting and database connectivity – PHP and MySQL:** Introduction to PHP, Syntax, Comments, Variables and their scope, Constants, Data types, Control structures, Built-in functions, Accessing form variables using GET and POST methods, Tracking users using cookies and sessions. PHP and MySQL database connectivity - Creating a database using MySQL, Creating a HTML or PHP form, connecting the form with MySQL database and executing insert, update, delete and select queries on database using PHP- MySQL database connectivity. Website security vulnerabilities.	**07**
7	**Web Extensions – XML and XSL:** Introduction to XML, Syntax and structure of XMLdocument, Element and naming rules, Attributes, Entity references, Comments, Namespaces, Document type definitions (DTD), XML schemas, Displaying raw XML documents. Introductionto XSL, XSL elements, Using XSL in XML documents, XSLT. Validating XML using DTD, Parsing XML data and storing in database. Flipped Classroom: Web services – WSDL, SOAP, UDDI. Web feeds – RSS.	**04**

List of Laboratory Experiments:

1. HTML
   a) Create a static web page using HTML.
   b) Create a class timetable using HTML.
   c) Create a registration form using HTML.
   d) Create a web page using HTML5 tags.
2. CSS
   a) Design a web page using External or Embedded Style Sheet.
3. CSS3
   a) Design a responsive web page using media queries and CSS3.
   b) Design a web page using Bootstrap.
   c) Design a resume using Bootstrap.
   d) Design the admission form using Bootstrap.
4. JavaScript
   a) Programs based on objects in JavaScript.
   b) Program to design a calculator using JavaScript.
5. JavaScript
   a) Programs based on form validation.
6. React JS

a) Create an application using React.

7. PHP
   a) Installation and configuration of XAMPP/ WAMP Server.
   b) Programs based on built-in functions in PHP.
8. PHP & MySQL
   a) Implement PHP – MySQL database connectivity.
9. XML & XSL
   a) Design XML using XML DTD and schema.
   b) Implementing XSL elements in XML.
   c) Validating XML data through DTD and storing in database.
10. Mini Project – Complete website development using client and server side technologies.

Books Recommended:

Text books:

1. DT Editorial Services, "HTML5 Black Book", 2nd Edition, Dreamtech Press, 2016.
2. Ben Frain, "Responsive Web Design with HTML5 and CSS3", 2nd Edition, Packt Publishing, 2015.
3. Steve Suehring, "JavaScript Step by Step", 3rd Edition, Pearson Education, 2013.
4. Stoyan Stefanov, "React Up Running Building Web Applications", 1st Edition, O'Reilly Media Inc., 2016.
5. David Sklar, "Learning PHP 5", 1st Edition, O'Reilly Media Inc., 2004.

Reference Books:

1. Benjamin LaGrone, "HTML5 and CSS3 Responsive Web Design Cookbook", 1st Edition, Packt Publishing, 2013.
2. DT Editorial Services, "Web Technologies: Black Book", 1st Edition, Dreamtech Press, 2018.
3. Christopher Schmitt, Kyle Simpson, "HTML5 Cookbook", 1st Edition, O'Reilly Media Inc., 2011.
4. Uttam K. Roy, "Web Technologies", 1st Edition, Oxford University Press, 2010.
5. Greg Sidelnikov, "React. Js Book: Learning React JavaScript Library from Scratch", 1st Edition, Independently Published, 2017.
6. Luke Welling; Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Addison-Wesley Professional PTG, 2017.

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.

Laboratory:

1. Practical and oral examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of atleast 10 experiments based on the above list.

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

i. Laboratory work (Performance of Experiments, Write-up): 15 marks

ii. Mini Project: 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 Head of the Department Principal

Program: Second Year Information Technology	Semester : IV
Course: Programing Laboratory 2 (Python)	Course Code: DJ19ITL406

Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			Total marks (A+ B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Avg.	
				--			--	--	--	--
				Laboratory Examination			Term work		Total Term work	50
-	2	--	1	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal		
				--	25	--	15	10	25	

Pre-requisite Subjects: Knowledge of

1. Structured Programming Approach
2. Java Programming

Course Objectives: The objective of the course is to expose students to a new programming language "Python3", thereby making them familiarized with the sequence data types and their interoperability, various control structures and object oriented programming in Python. To enable students develop GUI Applications and Web Applications with database connectivity. To lay the foundation of Machine Learning and Data Science Techniques with visualizations.

Course Outcomes: On successful completion of this course, student should be able to:

1. Write clean python code/Code correctly in Python with a clean coding standards.
2. Debug the programs.
3. Develop user friendly applications.
4. Implement basic Machine Learning and Data Science Techniques with visualizations.
5. Work effectively as a member of a team.

Detailed Syllabus: (unit wise)

Unit	Description	Duration
0	**Prerequisite:** Basic Programming syntax of Java/C. Installation and configuration of python	00
1	**Basics of Python**: Numbers in Python, Basic & Built-in Math functions, Number Formats, Strings, Quotes, print () Function, range() function, Assigning Values to Names & Changing Data Through Names, Copying Data, Tuples, Lists, Dictionaries, Sets, Numpy Arrays, Strings	04
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,	04

	Zip(), Map(), Reduce() function, recursion, Function Decorators	
3	**Object Oriented Programming:** 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, The Except Block, The assert Statement, User Defined Exceptions	**06**
4	**Introduction To Data Science Packages** : Creating Modules and Packages, Documenting & ViewingModule, Basics of Testing Your Modules and Packages, Importing & exporting Modules, Random,Matplotlib, Pandas, scipy, scikit learn Modules	**06**
5	**Files Handling:** Types of Files in Python, opening a File, Closing a File, Writing Text Files, Filecontent manipulation, working with Binary Files, Appending Text to a File, Reading Text Files, File Exceptions, The with Statement Pickle in Python, ZipFile Module.	**04**
6	**GUI Programming with Database Connectivity:** GUI Programming Toolkits, Creating GUI Widgets with Tkinter, Creating Layouts, Form Components, Dialog Boxes. Types of Databases Used with Python, Mysql database Connectivity with Python, Performing DML operations on database.	**02**
7	**Web Development Framework:** Flask -Templates, Flask Template Engine: Jinga, Flask-Jinga Template creation, Rendering a web based application.	**02**

List of Laboratory 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, Dictionaries.
4. Write a Python program to implement Arrays / Numpy Array (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, 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 a Python program to implement data analysis using pandas.
12. Write a Python program to implement basic scientific operations using scipy.
13. Write a Python program to implement data visualizations using matplotlib.
14. Write python programs to implement Exception handling.
15. Write python programs to understand different File handling operations with exception handling.
16. Write python programs to understand GUI designing and database operations (Programs based on GUI designing using Tkinter, Mysql database creation & Database connectivity with DML).
17. Write a Python program to implement Web based application with Flask Framework.

Evaluation Scheme:

Semester End Examination (A):

Laboratory:

1. Practical examination for 25 marks will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Laboratory: (Term work)

Term Work shall consist of at least 12 to 15 practical's based on the above list.

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

i Laboratory work (Performance of Experiments): 15 marks

ii Mini Project: 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 Head of the Department Principal

Program: Common for all program	Semester: IV
Course: Universal Human Values	Course Code: DJ19IHC1
Course: Universal Human Values Tutorial	Course Code: DJ19IHT1

<table>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="7">Evaluation Scheme</td></tr>
<tr><td colspan="3">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td rowspan="3">Total marks (A+ B)</td></tr>
<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="3">Theory</td><td>Term Test 1</td><td>Term Test 2</td><td>Avg.</td></tr>
<tr><td colspan="3">75</td><td>25</td><td>25</td><td>25</td><td>100</td></tr>
<tr><td colspan="3">Laboratory Examination</td><td colspan="3"></td><td rowspan="3">125</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">--</td><td rowspan="2">1</td><td rowspan="2">3</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td colspan="3">Total Term work (C)</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td colspan="3">25</td></tr>
</table>

Objectives:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society, and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

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

1. Become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability.
2. Become sensitive to their commitment towards what they have understood (human values, human relationship, and human society).
3. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit	Description	Duration in Hrs
1	**Introduction**: **Need, Basic Guidelines, Content and Process for Value Education** Purpose and motivation for the course. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	**05**

2	**Understanding Harmony in the Human Being - Harmony in Myself!** Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. Understanding the Body as an instrument of 'I' (I am being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.	**06**
3	**Understanding Harmony in the Family and Society: Harmony in Human-Human Relationship**. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	**06**
4	**Understanding Harmony in the Nature and Existence: Whole existence as Coexistence** Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.	**05**
5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**: Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order, b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers, b. At the level of society: as mutually enriching institutions and organizations.	**06**

Books Recommended:

Textbooks:

1. R R Gaur, R Sangal, G P Bagaria , "Human Values and Professional Ethics", Excel Books, New Delhi, 2010.

Reference books:

1. A Nagaraj, "Jeevan Vidya: Ek Parichaya", Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi, "Human Values", New Age International Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi, "The Story of My Experiments with Truth".

5. E. F Schumacher, “Small is Beautiful”.
6. Cecile Andrews, “Slow is Beautiful”
7. J C Kumarappa, “Economy of Permanence”.
8. Pandit Sunderlal, “Bharat Mein Angreji Raj”.
9. Dharampal, “Rediscovering India”.
10. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”.
11. Maulana Abdul Kalam Azad, “India Wins Freedom”.
12. Romain Rolland, “Vivekananda” (English).
13. Romain Rolland, “Gandhi” (English).

Evaluation:

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 onlive 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.

Continuous Assessment (C):

Tutorials: (Term work)

1. Term work shall consist of minimum 4 activities based on activities suggested.
2. Term work shall carry total 25 marks based on the performance in the tutorials.

The tutorials could be conducted as per the following topics: -

Activity No 1	Practice sessions to discuss natural acceptance in human being as the innate acceptance for livingwith responsibility (living in relationship, harmony, and co-existence) rather than as arbitrariness in choice based on liking-disliking.
Activity No 2	Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.
Activity No 3	Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students’ lives.
Activity No 4	Practice sessions to discuss human being as cause of imbalance in nature (film “Home” can beused), pollution, depletion of resources and role of technology etc.
Activity No 5	Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

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

Prepared by Checked by Head of the Department Principal

<table>
<tr><td colspan="8">Program: Information Technology</td><td colspan="3">Semester : IV</td></tr>
<tr><td colspan="8">Course : Innovative Product Development II</td><td colspan="3">Course Code: DJ19A4</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme (Hours/week)</td><td colspan="7">Evaluation Scheme</td></tr>
<tr><td colspan="3">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td rowspan="2">Total marks (A+ B)</td></tr>
<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="3">Theory</td><td>Term Test 1</td><td>Term Test 2</td><td>Avg.</td></tr>
<tr><td colspan="3">--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td colspan="3">Laboratory Examination</td><td colspan="2">Semester review</td><td rowspan="2">Total</td><td rowspan="3">100</td></tr>
<tr><td rowspan="2">--</td><td rowspan="2">--</td><td rowspan="2">--</td><td rowspan="2">--</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td>Review 1</td><td>Review 2</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>50</td><td>50</td><td>100</td></tr>
</table>

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 conceptualize and create a successful product.

Outcome:

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 conceptualizing 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 analyze 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 them 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

In the last review of the semester IV, the marks will be awarded as follows

- Marks awarded by the supervisor (Considering technical paper writing) 30
- Marks awarded by the review committee 20

NOTE: A candidate needs to secure a minimum of 50 % marks to be declared to have completed the audit course.

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

- In the semester III, 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.
- In the semester IV, the expected work shall be procurement of components/systems, building of the working prototype, testing and validation of the results based on work completed in semester III.
    - First review is based on readiness of building the working prototype.
    - Second review shall be based on a presentation as well as the demonstration of the working model, during the last month of semester IV. This review will also look at the readiness of the proposed technical paper presentation of the team.

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.

The semester reviews (III and IV) may be based on relevant points listed above, as applicable.

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 organizations having an experience of more than five years, approved by the Head of the Institution. The presence of the external examiner is desirable only for the 2nd presentation in semester IV. Students are compulsorily required to present the outline of the technical paper prepared by them during the final review in semester IV.

Prepared by Checked by Head of the Department Principal