



Shri Vile Parle Kelavani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Empowered Autonomous College Affiliated to the University of Mumbai)



Shri Vile Parle Kelavani Mandal's
Dwarkadas J. Sanghvi College of Engineering
(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus

Second Year B.Tech

in

**Computer Science and Engineering (IoT and
Cyber Security with Blockchain Technology)**
(Semester III)

Prepared by:- Board of Studies in Computer Science & Engineering

(IoT and Cyber Security with Blockchain Technology)

With effect from the Academic Year: 2026-2027



Shri Vile Parle Kelavani Mandal's

DWARKADAS J.SANGHVI COLLEGE OF ENGINEERING

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Scheme for Second Year Undergraduate Program in Computer Science and Engineering (IoT and Cyber Security with Block Chain Technology) : Semester III (Autonomous)
Academic Year (2026-2027)

Sr. No.	Course Code	Course	Teaching Scheme				Semester End Examination (SEE) - A				Continuous Assessment (CA) - B							Aggregate (A+B)
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Duration (Hrs)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Term Test 3 (TT3)	Term Total (TT1 + TT2 + TT3)	Term Work (B)	CA Total (B)	
1	DIS23BPC201	Linear Algebra and Optimization Techniques	2	--	--	2	60	--	--	--	60	15	15	10	40	--	40	100
	DIS23BPC201T	Linear Algebra and Optimization Techniques Tutorial	--	--	1	--	--	--	--	--	--	--	--	--	--	25	25	25
	DIS23BPC202	Data Structures	3	--	--	2	60	--	--	--	60	15	15	10	40	--	40	100
2	DIS23BPC202L	Data Structures Laboratory	--	2	--	2	--	--	--	25	25	--	--	--	--	25	25	50
	DIS23BPC203	Database Management Systems	2	--	--	2	60	--	--	--	60	15	15	10	40	--	40	100
3	DIS23BPC203L	Database Management Systems Laboratory	--	2	--	2	--	--	--	25	25	--	--	--	--	25	25	50
	DIS23BMD201	Operating Systems	2	--	--	2	60	--	--	--	60	15	15	10	40	--	40	100
5*	DIS23XOE211	Product Lifecycle Management																
	DIS23XOE212	Management Information System																
	DIS23XOE213	Operations Research																
	DIS23XOE214	Personal Finance Management																
	DIS23XOE215	Public Systems and Policies																
	DIS23XOE216	Fundamentals of Biomedical Instruments																
	DIS23XOE217	IPR and Patenting																
	DIS23XOE218	Entrepreneurship and Startup Ecosystem																
6	DIS23XHS231T	Professional and Business Communication Tutorial	--	--	2	--	--	--	--	--	--	--	--	--	--	50	50	50
7	DIS23XHS234	Economics and Financial Management	2	--	--	2	60	--	--	--	60	15	15	10	40	--	40	100
8	DIS23XEL201L	Community Engagement Service	--	2	--	--	--	--	--	--	--	--	--	--	--	25	25	25
9	DIS23XSC201P	Innovative Product Development I	--	2	--	--	--	--	--	--	--	--	--	--	--	25	25	25
10	DIS23BSC201	Python for Intelligent Data Analytics	1	--	--	--	--	--	--	--	--	15	15	10	40	40	40	40
Total			15	8	3	16	360	0	0	50	410	105	105	70	280	215	455	865

*Open Elective

Prepared by:
Dipali K Bhole

Checked by:
Dr. Vishakha Chelme

Head of Department

Vice Principal

Principal

Semester End Examination (SEE) – A

Course	Assessment Tools	Marks	Time (hrs.)
Theory / *	Written paper based on the entire syllabus.	60	2
Computer based	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	25	As applicable
Practical	Performance of the practical assigned during the examination and the output / results obtained.	25	2
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	As per the scheme	2

Continuous Assessment (B):

Course	Assessment Tools	Marks	Time (mins)
Theory	a. Term Test 1 (based on 40 % syllabus)	15	45
	b. Term Test 2 (on next 40 % syllabus)	15	45
	c. Assignment / course project / group discussion / presentation / quiz/ any other.	10	—
	Total marks (a + b + c)	40	—
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	—	As applicable
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	25	
Laboratory & Tutorial	Performance in the laboratory and tutorial.	50	



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)								S.Y.B.Tech		Semester : III	
Course : Linear Algebra and Optimization Techniques								Course Code: DJS23BPC201			
Course: Linear Algebra and Optimization Techniques Tutorial								Course Code: DJS23BPC201T			
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
2	2	--	3	Oral	Practical	Oral & Practical	Laborat ory Work	Tutorial / Mini project / presentation / Journal/ Practical	Total Term work		
				--	—	—	—	25	25		

Pre-requisite:

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

Objectives: The objective of the course is

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

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

1. Understand the concept of a basis in vector spaces and apply it to represent data points in terms of independent features or components.
2. Understand the role of linear transformations in machine learning algorithms, such as linear regression, logistic regression, and neural networks, for mapping inputs to outputs.
3. Apply eigenvectors in the context of secret-key cryptography to



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understand how transformations in key management can be represented by matrices.

4. Apply the concept of unconstrained optimization techniques to the engineering problems.

Detailed Syllabus:		
Unit	Description	Duration
1	Vector Space and Inner Product Spaces: Preview: Linear combinations of vectors, Linearly dependent and independent vectors. Definition of vector space over $\mathbb{R}$, Subspaces. Basis and Dimension. Dot product in $\mathbb{R}$, Definition of general inner product on a vector space over $\mathbb{R}$. Norm of a vector in an inner product space. Cauchy-Schwarz inequality. Orthogonal sets and orthonormal sets in an inner product space. Orthogonal and orthonormal bases. Gram-Schmidt orthogonalization process simple examples in $\mathbb{R}^2, \mathbb{R}^3$.	08
2	Linear Transformations: Definition and properties. Kernel and image of a linear transformation, Rank-Nullity Theorem. Invertible Linear Transformation, Relation between matrices and Linear Transformations, Change of bases.	06
3	Matrices: Eigen values, Eigen vectors and their properties. Cayley-Hamilton theorem (without proof) and its application. Similar matrices, diagonalization of matrix. Functions of square matrix. Singular value decomposition.	08
4	Calculus : Gradient, directional derivatives, Jacobian, Hessian, convex sets, convex functions, and its properties. Unconstrained optimization techniques: Newton's method, Quasi Newton method.	06
Total		28

Tutorial List:	
Tut.	Suggested Tutorials
1	Vector Space.
2	Inner Product Space.



3	Gram-Schmidt orthogonalization process.
4	Linear Transformation.
5	Eigen Value and Eigen Vector and Similarity of Matrices.
6	Similarity of Matrices and Diagonalization of Matrices.
7	Cayley-Hamilton Theorem, Functions of square matrix.
8	Singular value decomposition.
9	Calculus.
10	Unconstrained Optimization Techniques.

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

Books Recommended:

Text books:

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

Reference Books:

1. Elementary Linear Algebra, Stephen Andrilli and David Hecker, 5th Edition, Academic Press (2016)
2. Applied Abstract Algebra, Rudolf Lidl, Guter Pilz, 2nd Edition, Springer 2004.
3. Contemporary linear algebra, Howard Anton, Robert C Busby, Wiley 2003
4. Introduction to Linear Algebra, Gilbert Strang, 5th Edition, Cengage Learning (2015).
5. Operations Research by S.D. Sharma Kedar Nath, Ram Nath & Co. Meerat 2014
6. Engineering optimization (Theory and Practice) by Singiresu S.Rao, New Age International publication 2013.
7. Higher Engineering Mathematics, B. S. Grewal, 43rd Edition, Khanna Publishers, India, 2015.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Continuous Assessment (B)

Theory:

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.
2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Term Test 3 conduction can be Assignment /presentation /quiz/ any other for 10 marks.

Laboratory: (Term work)

Term work shall consist of a minimum eight tutorials.

The allocation of marks for tutorials shall adhere to the pre-established rubric parameters.

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

Vice Principal

Principal

Shilank Singh



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)						S.Y.B.Tech		Semester : III			
Course : Data Structures						Course Code: DJS23BPC202					
Course: Data Structures Laboratory						Course Code: DJS23BPC202L					
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term work			Total Term work	
3	2	--	4	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment		25	50
				--	--	25	15	10			

Pre-requisite:

Structured Programming Approach

Course Objectives: The objective of the course is

1. To introduce and familiarize students with linear and non-linear data structures, their use in fundamental algorithms and design & implementation of these data structures.
2. To introduce students to the basics of algorithms and time complexity.
3. To familiarize students with various sorting and searching techniques, and their performance comparison.

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

1. Understand the concept of time complexity for algorithms.
2. Apply the concepts of various linear data structures.
3. Assimilate the concept of nonlinear data structures trees.
4. Formulate the real world applications using nonlinear data structure graph.
5. Select appropriate searching and sorting algorithms for problem

**Detailed Syllabus:**

Unit	Description	Duration
1	Basics of Algorithms: Algorithms, Characteristics of an Algorithm, Time and Space Complexities, Order of Growth functions, Preliminary Asymptotic Notations. Data Structures: Introduction, need of Data Structures, Types of Data Structures, Abstract Data Types (ADT)	3
2	Linear Data Structures : LIST: List as an ADT, Array-based implementation, Linked List implementation, singly linked lists, circularly linked lists, doubly- linked lists, All operations (Insertion, Deletion, Merge, Traversal, etc.) and their analysis, Applications of linked lists - (Polynomial Addition).	8
3	Linear Data Structure – STACK: Stack as an ADT, Operations, Array and Linked List representation of Stack Applications – Reversing data, Conversion of Infix to prefix and postfix expression Evaluation of postfix and prefix expressions, balanced parenthesis, etc. Linear Data Structure – QUEUE: Queue as an ADT, Operations, Implementation of Linear Queue, Circular and Priority Queue using arrays and Linked List, DEQueue, Applications – Queue Simulation.	8
4	Non-Linear Data Structure – TREES: Tree Terminologies, Tree as an ADT, Binary Tree - Operations, Tree Traversals, Binary Search Tree (BST) - Operations, Expression Trees Height Balanced Tree: Creation of AVL Tree, Heap- Operations on heap Applications - Huffman coding Non-Linear Data Structure – GRAPHS: Graph Terminologies, Types of Graphs, Representation of Graph using arrays and Linked List, Breadth-First Search (BFS), Depth-First Search (DFS), Applications of Graphs - Topological sorting.	12
5	Searching- Linear Search, Binary Search. Sorting: Bubble Sort, Selection Sort, Heap Sort, Insertion Sort, Radix Sort, Merge Sort, Quick Sort, Analysis of Searching and Sorting Techniques. Hashing: Hash Functions, Overflow handling, Collision & Collision Resolution Techniques, Linear hashing, Hashing with chaining, Separate Chaining, Open Addressing, Rehashing and Extendible hashing.	11
Total		42

**Instructions to Perform Algorithms on Competitive Programming Platforms**

To implement, test, and analyze classical Searching and Sorting algorithms using online coding platforms such as LeetCode, HackerRank, CodeChef, Codeforces, or equivalent platforms, with problem-solving assignments tailored to students' skill levels—beginner-level problems for all students and advanced-level challenges for students demonstrating strong coding proficiency.

General Guidelines

1. Students should log in to any competitive coding platform such as LeetCode, HackerRank, CodeChef, Codeforces, or equivalent platforms using their registered email ID.
2. Each data structure and related operation must be implemented using an appropriate programming language (C / C++ / Java).
3. Before coding, analyze the selected data structure, its operations, applications, and input-output requirements.
4. Implement, compile, and execute each program with at least two sample test cases.
5. Record the output and note the observed performance in terms of time and space complexity wherever applicable.
6. Use the problem statement section of the IDE to write a short description of:
 - Data Structure Name
 - Operations Performed
 - Application of the Data Structure
7. Solve coding problems according to skill level:
 - **Beginner-level problems** for all students to strengthen fundamental concepts.
 - **Advanced-level problems** for students with good coding proficiency to enhance problem-solving and optimization skills.
8. Submit the source code, output screenshots, and complexity analysis for evaluation.
9. Maintain all records in a lab journal (write-up for each experiment) and upload the required documents on Microsoft Teams for continuous assessment.
10. Students are encouraged to analyze alternative approaches and compare the efficiency of different data structures for solving the same problem whenever applicable.

List of Laboratory Experiments:

Sr. No.	
1	Implementation of Linked List using menu driven approach.
2	Implementation of different operations on linked list—copy, concatenate, split, reverse, count no. of nodes etc.
3	Implementation of polynomials operations (addition, subtraction) using Linked List
4	Implementation of stack using menu driven approach.
5	Implementation of Infix to Prefix. Transformation and its evaluation program.
6	Implementation of prefix and postfix evaluation using menu driven approach.
7	Implementation of parenthesis checker using stack.
8	Implementation of Linear queue using menu driven approach.
9	Implementation of circular queue using menu driven approach.



10	Implementation of double ended queue menu driven program.
11	Implementation of Priority queue program using array and Linked list.
12	Implementation of Binary Tree using menu driven approach.
13	Implementation of Binary Tree Traversal.
14	Implementation of BST using following operations – create, delete, display.
15	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.
16	Implementation of Graph traversal using menu driven program (DFS & BSF).
17	Implementations of Selection sort, Radix sort using menu driven.
18	Implementation of Heap & Heap Sort using menu driven program.
19	Implementation of Advanced Bubble Sort and Insertion Sort using menu driven Program.
20	Implementation of searching methods (Index Sequential, Fibonacci search, Binary Search) using menu driven program.
21	Implementation of hashing functions with different collision resolution techniques.

Minimum 10 experiments from the above suggested list or any other tutorial based on syllabus may be included, which would help the learner to understand topic/concept.

Submission Instructions

- For each experiment, submit:
 - Data Structure Name**
 - Algorithm**
 - Source code** (with comments)
 - Input/output screenshots**

Books Recommended:

Text books:

- Reema Thareja, Data Structures using C, 3rd Edition, Oxford, 2023.
- Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, fundamentals of Data Structures in C, 2nd Edition, W. H. Freeman and Company, 2008.
- R. F. Gilberg and B. A. Forouzan, Data Structures – A Pseudocode Approach with C, 2nd Edition, Cengage Learning, 2007.

Reference Books:

- Tanenbaum, Langsam, Augenstein, Data Structures using C, Pearson, Second edition 2015.
- Kruse, Leung, Tondo, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2013.
- Aho, Hopcroft, Ullman, Data Structures and Algorithms, Addison-Wesley, 2010.

Web resources:

- Lectcode: <https://leetcode.com/problemset/all/>
- Hackerrank: <https://www.hackerrank.com/domains/tutorials/10-days-of-javascript>



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3. Codeforces: <https://codeforces.com/problemset>

4. Codechef: <https://www.codechef.com/practice>

Online Courses:

1.Data Structures And Algorithms By Naveen Garg , IIT Delhi

<https://nptel.ac.in/courses/106102064>

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus total comprising of 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

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

Continuous Assessment (B):

Theory:

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.
2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Term Test 3 can be conducted as Assignment / course project / group discussion /presentation / quiz/ any other for 10 marks.

Laboratory: (Term work)

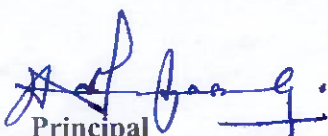
1. Term Work shall consist of at least 10 practical's based on the above list.
2. The distribution of marks for term work shall be as follows:
 - i. Laboratory work (Performance of Experiments, LeetCode, Write-up): 15 Marks.
 - ii. Assignment: (HackerRank Quiz, Descriptive/Analytical Questions): 10 Marks.The 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


Vice Principal


Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester : III		
Course : Database Management Systems							Course Code: DJS23BPC203				
Course: Database Management Systems Laboratory							Course Code: DJS23BPC203L				
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	Assign-ment	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term work			Total Term work	
2	2	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment	25		
				--	--	25	15	10			



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Detailed Syllabus:		
Unit	Description	Duration
1	Introduction Database Concepts: Introduction, Characteristics of databases, File system v/s Database system, Users of Database system, Schema and Instance, Data Independence, DBMS system architecture, Database Administrator	3
2	Relational Data Model: Entity-Relationship Model: The Entity-Relationship (ER) Model: Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, concept of Keys, Relationship constraints: Cardinality and Participation, Extended Entity-Relationship (EER) Model: Generalization, Specialization and Aggregation. Relational Model: Introduction to the Relational Model, relational schema, Mapping the ER and EER model to the Relational model.	7
3	Structured Query Language (SQL): Overview of SQL, Data Definition Commands, Data Manipulation commands, Integrity constraints - key constraints, Domain Constraints, Referential integrity, check constraints, Data Control commands, Transaction Control Commands, Set and String operations, aggregate function – group by, having, Views in SQL, joins, Nested and complex queries, Triggers.	7
4	Relational-Database Design: Pitfalls in Relational-Database designs, Concept of normalization, Function Dependencies, Normal Forms- 1NF, 2NF, 3NF, BCNF.	5
5	Transaction Management and Recovery: Transaction Concept, ACID properties, Transaction States, Concurrent Executions, Serializability, Concurrency Control Protocols: Lock-based, Timestamp based, Validation Based, Recovery System: Failure classification, Log based recovery, Shadow Paging, ARIES recovery algorithm. Indexing Mechanism: Hashing techniques, Types of Indexes: Single Level Ordered Indexes, Multilevel Indexes, Overview of B-Trees and B+ Trees.	6
Total		28

1.

List of Laboratory Experiments:	
Sr. No.	Suggested Experiments
1	To draw an ER diagram for a problem statement.
2	Map the ER/EER to relational schema.



3	To implement DDL and DML commands with integrity constraints.
4	To access & modify Data using basic SQL.
5	To implement Joins and Views.
6	To implement Subqueries.
7	To implement triggers.
8	Examine the consistency of database using concurrency control technique (Locks)
9	To simulate ARIES recovery algorithm.
10	To implement B-trees/B+ trees.

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

Books Recommended:**Text books:**

1. Korth, Silberschatz, Sudarshan, Database System Concepts, 7th Edition, McGraw – Hill, 2021
2. Elmasri and Navathe, Fundamentals of Database Systems, 7th Edition, Pearson Education, 2021.
3. G. K. Gupta: Database Management Systems, 3rd Edition, McGraw – Hill, 2011

Reference Books:

1. Raghu Ramkrishnan and Johannes Gehrke, Database Management Systems, TMH, 2014
2. Shamam Shah, Oracle for Professional", SPD, 2008.
3. Dr. P.S. Deshpande, "SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press, 2011
4. Patrick Dalton, Microsoft SQL Server Black Book, Coriolis Group, U.S., 2007
5. Lynn Beighley, Head First SQL, O'Reilly Media, 2011

Evaluation Scheme:**Semester End Examination (A):****Theory:**

1. Question paper based on the entire syllabus total comprising of 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Laboratory:

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

Continuous Assessment (B):**Theory:**

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.



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2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Term Test 3 can be conducted as Assignment / course project / group discussion / presentation / quiz/ any other for 10 marks.

Laboratory: (Term work)

Term Work shall consist of at least 8 practical's based on the above list and a minimum of 2 assignments.

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

Vice Principal

Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)								S.Y.B.Tech		Semester : III	
Course : Operating Systems								Course Code: DJS23BMD201			
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term work			Total Term work	
2	--	--	2	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment	--		
				--	--	--	--	--		--	

Pre-requisite:

1. Programming Language C.

Course Objectives: The objective of the course is

1. To understand the structure, functions and characteristics of computer system
2. To familiarize students with the functionality of an Operating System
3. To analyze, evaluate and implement different policies for scheduling, deadlocks, memory management, synchronization, file management & I/O.

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

1. Describe the fundamental organization of a computer system.
2. Identify the role of Operating System in terms of process, memory, file and I/O System .
3. Identify the need of concurrency and apply appropriate method to solve the concurrency or deadlock problem.
4. Analyse appropriate memory mapping, memory allocation methods.
5. Apply different techniques of file management and disk scheduling algorithms.



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Detailed Syllabus:		
Unit	Description	Duration
1	Introduction to System Fundamentals: Von Neumann model, Fixed point representation, Register Transfer and Micro-operations: Floating point representation, Arithmetic Micro Operations, Arithmetic logical shift unit. Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes	04
2	Operating System Architecture: Basic functions and services, Types of Operating Systems: Batch, multiprogramming. Multitasking, distributed & real - time operating systems. Process Management: Process Concept, Process states, Process control, Threads Scheduling: Types of scheduling: Pre-emptive, Non pre-emptive Scheduling algorithms: FCFS, SJF, RR, Priority.	06
3	Concurrency control: Principles of Concurrency, Mutual Exclusion: Semaphores, Classical Problems of Synchronization: Producer and Consumer problem and solution. Deadlock: Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Dining Philosopher problem.	05
4	Memory Management: Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit) Paging: Page replacement policies: FIFO, Optimal, LRU, LFU	05
5	File and I/O management: Overview, File Organization and Access, Secondary Storage Management: File Allocation Methods. I/O Devices, I/O Buffering, Role of the operating system in I/O management. Disk Scheduling: Disk Scheduling algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, C-LOOK	08
Total		28

Books Recommended:

Text books:

1. William Stallings, Computer Organization and Architecture, Pearson 10th Edition, 2016.
2. Abraham Silberschatz, Greg Gagne, Peter Baer Galvin, Operating System Concepts, 8th Edition, Wiley, 2018.
3. Tanenbaum, Modern Operating System, 4th Edition, Pearson Education, 2014.
4. William Stallings, Operating Systems: Internal and Design Principles, 8th Edition, Pearson, 2014.

Reference Books:

1. John Hayes, Computer Architecture and Organization, McGrawHill, 3rd Edition, 2017.
2. M. Morris Mano, Computer System Architecture, Pearson, 3rd Edition, 2017.
3. Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, 6th Edition, PHI, 2016.



4. M. Murdocca & V. Heuring, Computer Architecture & Organization, WILEY, 2010.
5. A Tanenbaum, Operating System Design and Implementation, 3rd Edition, Pearson, January 2015.
6. Phillip A. Laplante, Seppo J. Ovaska, Real Time Systems Design and Analysis, 4th Edition, Wiley-IEEE Press, Dec 2011.
7. Naresh Chauhan, Principles of Operating Systems, 1st Edition, Oxford University Press, 2014

Web resources:

1. Advanced Computer Architecture
<https://batch.libretexts.org/print/Finished/workforce-14821/Preview.pdf?view=true>
2. Operating systems: <https://www.cl.cam.ac.uk/teaching/1011/OpSystems/os1a-slides.pdf>

Online Courses: NPTEL / Swayam

1. Fundamentals of Computer Systems, Dr. Mangala Prasad Mishra, Indira Gandhi National Open University
Link: https://onlinecourses.swayam2.ac.in/nou20_cs03/preview
2. Operating System Fundamentals, Prof. Santanu Chattopadhyay, IIT Kharagpur Link:
https://onlinecourses.nptel.ac.in/noc21_cs88/preview
3. Computer architecture and organization, Prof. Indranil Sengupta, Prof. Kamalika Datta, IIT Kharagpur
Link: https://onlinecourses.nptel.ac.in/noc21_cs61/preview

Evaluation Scheme:

Semester End Examination (A):

Theory:

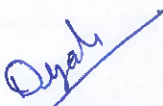
1. Question paper based on the entire syllabus total comprising of 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Continuous Assessment (B):

Theory:

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.
2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Term Test 3 can be conducted as Assignment/course project/group discussion /presentation/quiz/case study for 10 marks.


Prepared by


Checked by


Head of the Department


Vice Principal


Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)								S.Y B.Tech.		Semester: III	
Open Elective for all Programs											
Course : Product Life Cycle Management								Course Code: (DJS23XOE211)			
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
3	--	--	3	Oral	Practical	Oral & Practical	Laborato ry Work	Tutorial / Mini project / presentation/ Journal/ Practical		Total Term work	--
				--	--	--	--	--		--	

Pre-requisite:

1. Basic Management knowledge

Objectives:

1. To familiarize the students with the need, benefits and components of PLM.
2. To acquaint students with Product Data Management & PLM strategies.
3. To give insights into new product development program and guidelines for designing and developing a product.
4. To familiarize the students with Virtual Product Development.
5. To acquaint students with the need of Environmental aspects in PLM & its implementation.

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

1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
2. Illustrate various approaches and techniques for designing and developing products.
3. Acquire knowledge in applying virtual product development tools.
4. Acquire knowledge in implementation of Environmental aspects in PLM.



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Product Life Cycle Management (DJS23XOE211)		
Unit	Description	Duration
1	Introduction to Product Lifecycle Management (PLM): Product Lifecycle management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications. PLM Strategies: Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM.	08
2	Product Design and Development: Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase.	08
3.	Methodological Evolution of Product Design: Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering, Life Cycle Approach, Characteristic Features of Life Cycle Approach. The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process. New Product Development (NPD) and Strategies, Product Configuration and Variant Management. Integration of Environmental Aspects in Product Design: Sustainable Development Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design, Tools and techniques for integrated design, Implementation of international standards.	10
4	Product Data Management (PDM): Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation. Virtual Product Development Tools: For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modelling and simulations in Product Design, Examples/Case studies.	08
5	Engineering Methods for product Duration design & evaluation: Durability of Products and Components, Design for Fatigue, Infinite Life Approach, Design for Finite Life.	08



	Product Recovery Planning & Analysis: Approach to the Recovery Problem, Method for Recovery Cycles Planning, Calculation Models for Recovery Cycles Planning, Basic procedure, Determinant Factors for Recovery, Effective Component Reusability, Recovery Fractions, Extension of Useful Life.	
	Total	42

Books Recommended:

Textbooks:

1. John Stark, — Product Lifecycle Management: Paradigm for 21st Century Product Realisationl, Springer-Verlag, 2004. ISBN: 1852338105
2. Fabio Giudice, Guido La Rosa, Antonino Risitano, — Product Design for the environment-A life cycle approachl, Taylor & Francis 2006, ISBN: 0849327229

Reference Books:

1. Saaksvuori Antti, Immonen Anselmie, — Product Life Cycle Managementl, Springer, Dreamtech, ISBN: 3540257314
2. Michael Grieve, — Product Lifecycle Management: Driving the next generation of lean thinkingl, Tata McGraw Hill, 2006, ISBN: 0070636265
3. François Villeneuve, Luc Mathieu, Max Giordano —Product Life-Cycle Management: Geometric Variations. (2010). United Kingdom: Wiley.

Evaluation Scheme:

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.


Prepared by


Checked by


Head of the Department


Vice-Principal


Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)								S.Y B.Tech.		Semester: III	
Open Elective for all Programs											
Course : Management Information System								Course Code: DJS23XOE212			
Teaching Scheme (Hours / week)				Evaluation Scheme							
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)				Total marks (A+ B)
Lectures	Practical	Tutorial	Lectur es	Theory			Term Test 1	Term Test 2	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
3	--	--	3	Oral	Practical	Oral & Practical 1	Labor atory Work	Tutorial / Mini project / presentati on/ Journal/ Practical	Total Term work	--	
				—	—	—	—	—	—		

Pre-requisite:

Nil

Objectives:

1. The course is blend of management and technical field.
2. Discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built.
3. Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage.
4. Identify the basic steps in systems development.

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

1. Explain the fundamental concepts of the management information systems used in business.
2. Describe IT infrastructure and its components and its current trends.
3. Use the tools and technologies for accessing information from databases to improve business performance and decision making



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4. Identify and explain the security and ethical challenges in MIS along with the measures to be taken
5. Select a suitable social computing platform for the given requirements that integrates AI and IoT.
6. Explain the processes involved in the information system within the organization includes information acquisition and enterprise and global management technologies.

Management Information Systems (DJS23XOE212)		
Unit	Description	Duration
1	Foundation Concepts • Definition and scope of Management Information Systems (MIS) in business. • Functional area information system, • The components of information systems, • Impact of IT on organizations and society, • Business Process – BPR and BPI. • Business Pressure, Organizational responses. • Competitive Advantage and Strategic IS's.	04
2	Information Technology Infrastructure • Overview of IT infrastructure, • Hardware and software, • Computer systems: End user and enterprise, • Computing computer peripherals: Input, output, and storage technologies, • Application software: End user applications, • System software: Computer system management, • Data resource management: Technical foundations of database management, Managing data resources, Big data, Data warehouse and data marts, Knowledge management, • Networks: The networked enterprise (wired and wireless), Pervasive computing, Cloud computing models,	07
3	MIS Tools and applications for Decision making • ERP and ERP support of business • Business intelligence (BI): Managers and Decision Making. • Decision Support System (DSS): types, components, Data mining. • Executive information system. • Role of AI in decision making. • Role of predictive analytics and data visualization in business	10
4	Security and Ethical Challenges • Information security fundamentals • Key principles of information security • Common threats and vulnerabilities in MIS • Security measures and controls • Access control mechanisms: authentication, authorization, and accounting (AAA) • Encryption techniques and cryptographic protocols	08



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Evaluation Scheme:

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

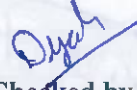
Continuous Assessment (B):

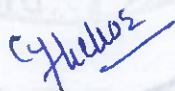
Will consist of following three components:

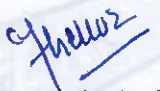
- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

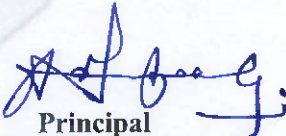
Total summing up to 40 marks.


Prepared by


Checked by


Head of the Department


Vice-Principal


Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III	
Open Elective for all Programs										
Course : Operations Research							Course Code: DJS23XOE213			
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Term Test 3	Total
				60			15	15	10	40
				Laboratory Examination			Term Work			
3	--	--	3	Oral	Practical	Oral & Practical	Labor atory Work	Tutorial / Mini project / presentati on/ Journal/ Practical	Total Term work	
				--	--	--	--	--	--	

Pre-requisite: Knowledge of

1. Mathematics.
2. Probability

Objectives:

1. Formulate a real-world problem as a linear programming problem and able to solve.
2. Understand the optimisation tools that are needed to solve linear programming problems.

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

1. Formulate the real-world optimisation problem into a Linear Programming Problem (LPP) and analyse the solution obtained using LPP optimisation models.
2. Solve Linear Programming Problems using transportation and assignment models.
3. Apply Decision Theory to determine the optimal course of action when a number of alternatives are available, and their consequences cannot be forecast with certainty and uncertainty.



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4. Apply Game Theory for decision making under conflicting situations where there are one or more opponents (players).
5. To breaking down a large problem into smaller sub problems and solved recursively or iteratively using Dynamic Programming models.

Operation Research (DJS23XOE213)		
Unit	Description	Duration
1	Introduction to Operations Research: Introduction, Structure of the Mathematical Model, Limitations of Operations Research. Linear Programming: Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical method, Simplex Method, Penalty Cost Method or Big M-method, Two Phase Method.	12
2	Transportation Problem: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: MODI method. Assignment Problem: Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Processing of n Jobs Through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem Routing Problem	10
3	Decision Theory: Steps in Decision Theory approach, Decision-making Environment, Decision making under condition of certainty, Decision making under condition of uncertainty, Decision making under condition of risk, Maximum likelihood criterion.	07
4	Game Theory: Competitive games, rectangular game, saddle point, minimax/maximin method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.	07
5	Dynamic programming: Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stagecoach/Shortest Path, cargo loading and Reliability problems.	06
	Total	42



	• Ethical, and societal challenges of IT • Legal and regulatory framework • Privacy Policies	
5	Social Computing (SC) • Web 2.0 and 3.0: static and dynamic platform, integration with AI and IoT • SC in business-shopping: leveraging social media platforms, Social listening and sentiment analysis • Social computing in Customer Relationship Management (CRM) • Marketing, operational and analytic CRM • E-business and E-commerce – B2B B2C, E-commerce platforms and payment gateways • Mobile commerce: growth trends, mobile wallets, contactless payments, shopping apps and platforms	07
6	Information System within Organization • Acquiring Information Systems and Applications: Various System development life cycle models • Enterprise and Global Management of Information Technology: Managing Information Technology, Managing Global IT • Business processes and information systems	06
	Total	42

Books Recommended:

Textbooks:

1. A. K. Gupta, "Management Information System", S. Chand Limited, 2010.
2. K.K. Ghosh, Saini Das, and S. Mukherjee, "Management Information System", Management, IIT, Kharagpur, 2021.

Reference Books:

1. J. A. O'Brien, G. Marakas, "Management Information Systems", McGraw-Hill Companies, Incorporated, 2006.
2. K. Rainer, B. Prince, "Management Information Systems", Wiley, 2016.

Web References

- Management Information System (<https://nptel.ac.in/courses/110105148>)
- Management Information System (<https://archive.nptel.ac.in/courses/110/105/110105148/>)



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Evaluation Scheme:

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.

Prepared by

Checked by

Head of the Department

Vice-Principal

Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III	
Open Elective for all Programs										
Course : Personal Finance Management							Course Code: DJS23XOE214			
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Term Test 3	Total
				60			15	15	10	40
				Laboratory Examination			Term Work			
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentati on/ Journal/ Practical	Total Term work	
				—	—	—	—	—	—	
Total marks (A+ B)										
100										
--										

Pre-requisite:

1. Nil

Objectives:

1. To create awareness and educate consumers on access to financial services.
2. To make the students understand the basic concepts, definitions and terms related to direct taxation.
3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after considering the eligible input tax credit.
4. To familiarize the students with microfinance for accelerating the expansion of local microbusinesses.

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

1. Understand the Indian financial system.



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2. Use a framework for financial planning to understand the overall role finances play in his/her personal life.
3. Compute income from salaries, house property, business/profession, capital gains and income from other sources.
4. Compute the amount of CGST, SGST and IGST payable after considering the eligible input tax credit.
5. Understand how Microfinance can help in financial inclusion.

Personal Finance Management (DJS23XOE214)		
Unit	Description	Duration
1	Overview of Indian Financial System: Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion. Introduction to Personal Finance Personal Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.	08
2	Personal Financial Management Loans: Home, Car, Education, Personal, Loan against property and Jewel loan. Insurance: Types of Insurance – ULIP and Term; Health and Disability Income Insurance, Life Insurance. Investment: Investing Basics and Evaluating Bonds, Investing in Stocks and Investing in Mutual Funds, Planning.	08
3	Income Tax Income Tax Act Basics- Introduction to Income Tax Act, 1961 Heads of Income and Computation of Total Income and Tax Liability- Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons. Tax Management, Administrative Procedures and ICDS - TDS, TCS and Advance Tax Administrative Procedures, ICDS.	09
4	Goods and Services Tax GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration. Levy and Collection of GST Taxable event- "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of	09



	expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services	
5	Introduction to Micro – finance Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinances, Customers of Micro-finance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self-Help Groups (SHGs). Models in Microfinance - Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges. Institutional Mechanism Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India: NGO-MFIs, NBFC-MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFIs	08
	Total	42

Books Recommended:**Textbooks:**

1. Banking and Financial Sector Reforms in India, by Asha Singh, M.S. Gupta, Serials Publication.
2. Indian Banking Sector: Essays and Issues (1st), by M.S. Gupta & J.B. Singh, Serials Publication.
3. Basics Of Banking & Finance, by K.M. Bhattacharya O.P. Agarwal, Himalaya Publishing House.
4. Agricultural Finance and Management, by S. Subba Reddy, P. Raghu Ram.
5. The Indian Financial System and Development, by Dr.Vasant Desai, Himalaya Publishing House; Fourth Edition.
6. Income Tax Management, Simple Way of Tax Management, Tax Planning and Tax Saving, By Sanjay Kumar Satapathy.
7. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.
8. Simplified Approach to GST Goods and Services Tax, By S K Mishra, Educreation Publishing.
9. Introduction To Microfinance, By Todd A Watkins, World Scientific Publishing Company

Evaluation Scheme:**Semester End Examination (A):****Theory:**

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.



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Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.

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Prepared by

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Checked by

Gheller

Head of the Department

Gheller

Vice-Principal

A. J. Sanghi

Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III		
Open Elective for all Programs											
Course : Public Systems and Policies							Course Code: DJS23XOE215				
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work	--	

Pre-requisite:

Basic Knowledge of Social science and Current affairs

Objectives:

1. To explain public policy and its operations with special focus on policy relating to Government finance.
2. To analyze and evaluate the impact of public policy on firms and the economy at large.

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

1. Understand the importance of public systems in a fast-changing environment in the global context.
2. Analyse the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.
3. Explain public policy and its operations with special focus on policy relating to Government finance.



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4. Make policies and know about the happenings in the world, in the nation and those in their locality.
5. Analyze and evaluate the impact of public policy on firms and the economy at large and work under various fields as policymakers.

Public Systems and Policies (DJS23XOE215)		
Unit	Description	Duration
1	Introduction and Overview of Public Systems: Ideology of Public Systems; Mechanistic and Organic view of Society and Individuals, The Legal Framework; Federal Government; State and Local Governments, Government growth; The size of Government.	10
2	Public Sector in the Economics Accounts: Public Sector in the circular flow; Public Sector in the National Income Accounts.	07
3	Public Choice and Fiscal Politics: Direct Democracy; Representative Democracy; The Allocation Function; The Distribution Function; The Stabilization Function; Coordination of Budget Functions; The Leviathan Hypothesis.	08
4	Introduction and Overview of Public Policy: Markets and Government; Social goods and Market failure, public expenditure and its evaluation; Cost Benefit Analysis, Public policy and Externalities, Taxation Policy and its impact, Income distribution, redistribution and social Security issues Fiscal & Budgetary Policy, Fiscal Federalism in India.	10
5	Case Studies in Expenditure Policy: Public Services A) National Defense B) Highways C) Outdoor Recreation D) Education	07
	Total	42

Books Recommended:

Reference Books:

1. Charles J, Wheelan, "Introduction to Public Policy", W.W. Norton & Company, New York, 2011.
2. Thomas R, Dye, "Understanding Public Policy", Prentice Hall, 2008.
3. Anderson, James E, "Public Policy-Making: An Introduction", Boston, 2011.
4. Avasthi & Maheshwari, "Public Administration", Lakshmi Narain Agarwal, 2008.
5. Mohit Bhattacharya, "New Horizons of Public Administration", Jawahar Publishers, New Delhi, 2011
6. Nicholas Henry, "Public Administration and Public Affairs", Prentice Hall of India, New Delhi, 2017.
7. Harvey S Rosen and Ted Gayer, "Public Finance" 10th Edition, McGraw-Hill Education, 2013.
8. Richard A Musgrave and Peggy B Musgrave, "Public Finance in Theory and Practice", 5th Edition, Mcgraw Hill Book, 2017.



Books Recommended:

Textbooks:

1. Operations Research - An Introduction: Taha, H. A., Pearson Education, 2022.
2. Operations Research, Gupta, P. K. and Hira, D. S., S. Chand Publications, 2014.

Reference Books:

1. Operations Research: Introduction to Models and Methods, Boucherie, R. J., Tijms, H. and Braaksma, A., 2021.
2. Introduction to Operations Research: Hiller, F. S. and Lieberman, G. J., McGraw-Hill Higher Education, 2010.
3. Operations Research: Principles and Practice: Ravindran, A., Phillips, D. T. and Solberg, J. J., Wiley India Pvt. Limited, 2009.

Evaluation Scheme:

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.

Prepared by

Checked by

Head of the Department

Vice-Principal

Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III		
Open Elective for all Programs											
Course : Fundamentals of Biomedical Instruments							Course Code: DJS23XOE216				
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
3	--	--	3	Oral	Practical	Oral & Practical 1	Laboratory Work	Tutorial / Mini project / presentati on/ Journal/ Practical		Total Term work	--
				--	--	--	--	--	--		

Pre-requisite:

1. Basic knowledge of Human Anatomy
2. Basic knowledge of Electronics

Objectives:

1. To understand the basic principles and working of various medical instruments.
2. To familiarize the learners with the various medical imaging modalities, their operating principles, instrumentation and clinical applications.

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

1. Associate & describe the different physiological processes taking place within the human body.
2. Identify the use of biomaterials and apply principles of various transducers & sensors.
3. Demonstrate the working principle of various medical instruments.
4. Demonstrate principles used in imaging modalities and analysis.



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5. Identify different processes used in telemetry and telemedicine.

Fundamentals of Biomedical Instruments (DJS23XOE216)		
Unit	Description	Duration
1	Basic Human Physiology • Cell: Electrical activity of excitable cells (Structure and functions of cell. Polarization and depolarization of cell) • Cardiovascular System: Heart, Conductive tissues of heart, Cardiac cycle, Heart Valves, System and Pulmonary Circulation, Transmission of Cardiac Impulse, Blood Pressure, ECG (Einthoven's Triangle, Various leads and Waveforms). • Muscle Physiology: Muscle physiology and aspects of skin resistance. Generation of EMG • Nervous System: Different parts, their functions. Reflex actions and reflex arc, Function of Sympathetic and Parasympathetic nervous system. Generation of EEG	06
2	Biomaterial, Transducers and Sensors: • Biomaterials used in fabrication of Biodevices and implants: Polymeric, Composite biomaterials, Metallic biomaterials, and Ceramic biomaterials. • Biopotential electrodes: Electrode tissue interface, Electrode electrolyte interface Electrodes used for ECG, EEG & EMG. • Transducers & sensors: temperature transducer, pulse sensor, glucose sensor, respiration sensor • Introduction of biomaterials, Classification of biomaterials	10
3	Overview of Medical Instruments • Classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment	08

	• Method of operation of these Bio Medical Instruments • ECG , EEG,EMG	
4	Imaging Modalities and Analysis: • Radio graphic techniques, Computer Tomography, • MRI, PET, SPECT • Ultrasonography • Endoscopy • Thermography, Retinal Imaging • Imaging application in Biometric systems • Analysis of digital images	10



5	Telemetry & Telemedicine: • Introduction to Biotelemetry • Physiological parameters compliant to biotelemetry • Components of Biotelemetry system • Applications of telemetry in medical field (ECG, EEG & EMG)	08
	Total	42

Books Recommended:**Textbooks:**

1. Leslie Cromwell, Biomedical Instrumentation and Measurement, Prentice hall of India, New Delhi, 2007.
2. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi, 2 Edition, 2003.
4. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.
5. Biomaterials Science - An Introduction to Materials in Medicine. B.D. Ratner, A.S. Hoffmann, F. J. Schoen, J. E. Lemons, Academic Press, 1997.

Reference Books:

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad
2. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
3. Curry, T. S., Dowdey, J. E., & Murry, R. C. (1990). Christensen's physics of diagnostic radiology. Lippincott Williams & Wilkins.
4. Biomaterials: An Introduction, Joon Park, R. S. Lakes, Springer Science & Business Media

Semester End Examination (A):**Theory:**

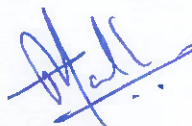
Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

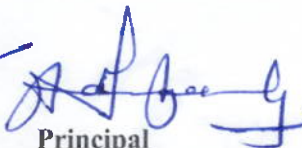
Total summing up to 40 marks.


Prepared by


Checked by


Head of the Department


Vice-Principal


Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III	
Open Elective for all Programs										
Course: IPR and Patenting							Course Code: DJS23XOE217			
Teaching Scheme (Hours / week)				Evaluation Scheme						
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)			
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	Term Test 3	Total
				60			15	15	10	40
				Laboratory Examination			Term Work			
3	--	--	3	Oral	Practical	Oral & Practical 1	Labor atory Work	Tutorial / Mini project / presentati on/ Journal/ Practical	Total Term work	--
				—	—	—	—	—	—	

Pre-requisite:

- NIL

Objectives:

1. To promote the knowledge of intellectual property laws of India and international treaties.
2. To encourage innovation.

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

1. Map a given project/ idea to a suitable intellectual property rights.
2. Explain the fundamentals of the patents, copyrights, and design registrations.
3. Draft applications to protect various intellectual property rights.
4. Communicate with national and/or international intellectual property organisations.



IPR and Patenting (DJS23XOE217)

Unit	Description	Duration
1	Introduction to Intellectual Property Rights (IPR): • Concept & meaning of IP and IPR. • General principles of intellectual property rights. • Need for intellectual property. • Categories of IPR instruments - Patents, Trademarks, Copyrights, Industrial Designs, Plant variety protection, Trade secrets, Geographical Indications etc. • Ownership, assignment, licenses, infringement, validity period. • International treaties on IPR.	06
2	Copyright and Design • The Indian Copyright Act, 1957. • Meaning of copyrights and rights of copyrighted works. • Types of copyright. • Process of filing a copyright application. • Introduction to Designs Law – Definitions. • Registration of designs and procedure.	09
3	Basics of Patents • The Indian Patent Act and The Indian Patent Rules. • Conditions of patentability. • Patentable and non-patentable inventions. • Types of patent applications and patent specification. • Inventors and Applicants. • Category of applicants - natural person, small entity, startup and others. • Patent databases and patent search. • International Patent Classification code.	09
4	Patent Application Drafting • Patent application drafting: ○ Application. ○ Specification. ○ Claims drafting: ▪ Independent and dependent claims drafting. ▪ Process patent and product patent claims. ○ Abstract. ○ Drawings. ○ Declaration as to inventorship. ○ Statement and undertaking. • Drafting response to communications from patent office. ○ Reading and understanding examination reports. ○ Drafting response.	09



5	Procedure for Filing a Patent Application, Timelines and Fees • Application for grant of patent. • Forms and Fees. • Request for (early) publication and / or (early) examination. • Patent examination and hearing. • Pre-grant and post-grant opposition	09
	Total	42

Books Recommended:

Textbooks:

1. A Durafe and D Toradmalle, "Intellectual Property Rights", Wiley, 2020.
2. H Rockman, "Intellectual property law for engineers, scientists, and entrepreneurs", Wiley-IEEE Press, 2020.

Reference Books:

1. Bare Act, "The Patents Act, 1970 with The Patents Rules, 2003", Universal, 2023.
2. Bare Act, "The Copyright Act, 1957", Universal and LexisNexis, 2021.
3. Bare Act, "The Designs ACT, 2000", Commercial Law Publishers (India) Pvt. Ltd. 2021

Web Resources:

1. W. Fisher, "Maps of Intellectual Property" <https://cyber.harvard.edu/people/tfisher/IP/IPMaps.htm>
2. World Intellectual Property Organisation courses <https://www.wipo.int/academy/en/>
3. Prof. Feroz Ali, "Patent Drafting for Beginners", https://onlinecourses.nptel.ac.in/noc24_hs59/preview/

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.

Prepared by

Checked by

Head of the Department

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Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y B.Tech.		Semester: III		
Open Elective for all Programs											
Course : Entrepreneurship and Startup Ecosystem							Course Code: DJS23XOE218				
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	Term Test 3	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term Work				
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentati on/ Journal/ Practical	Total Term work	--	
				—	—	—	—	—	—		

Pre-requisite:

Nil

Objectives:

1. To foster an entrepreneurial mindset.
2. To guide participants in building effective Business Models.
3. To educate participants regarding Intellectual property and Fundraising for Innovative Ventures.

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

1. Effectively Navigate the Global Startup Landscape:
2. Cultivate an Entrepreneurial Mindset.
3. Create Effective Business Models.
4. Understand the significance of Intellectual Property rights.
5. Master Fundraising Strategies



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Entrepreneurship and Start-up Ecosystem (DJS23XOE218)		
Unit	Description	Duration
1	Understanding the Entrepreneurial Ecosystem • Introduction to Entrepreneurship and Startups • Role of Entrepreneurship in economy • Global and Local Entrepreneurial Landscapes • Role of Incubators and Accelerators • Case Studies of Successful Startups	8
2	Developing a Startup Mindset • Cultivating an Entrepreneurial Mindset • Market Analysis and Segmentation • Opportunity Recognition • Innovation and Idea Generation • Feasibility Analysis of Business Ideas • Role of innovation in Entrepreneurship • Fostering creativity • Practical Exercises and Workshops on Creative Problem Solving	8
3	Business Model Development • Introduction to Business Models • Lean Startup Methodology • Prototyping and Minimum Viable Product (MVP) • Financial Projections and Budgeting • Various forms of Business Ownership • Compliance and Legal Regulations • Operations and Supply Chain Management • Human Resource Management • Developing a marketing Strategy • Managing Growth Challenges	10
4	Technological Innovation and Intellectual Property • Technology and Entrepreneurship • Intellectual Property Basics (Patents, Trademarks, Copyrights) • Patent Search and Analysis • Strategies for Protecting Intellectual Property Ethical Considerations in Technology and Innovation	8
5	Fundraising and Investment Strategies • Fundraising Options for Startups • Angel Investors and Venture Capital • Crowdfunding Platforms • Financial Modelling for Startups Crafting an Effective Pitch	8
		42



Students shall complete five module-wise assignments or may opt for a relevant MOOC courses instead.

The faculty will decide whether Term Test 2 will be conducted or replaced with a presentation on a Start-up Idea.

Books Recommended:

1. Alexander Osterwalder and Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, John Wiley & Sons, Jul2010.
2. Peter Thiel and Blake Masters, Zero to One: Notes on Startups, or How to Build the Future, Virgin Books, 2015.
3. Alejandro Cremades, The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know" by, John Wiley & Sons, Inc., Hoboken, New Jersey, 2016.
4. Christensen, Clayton M. The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Boston, MA: Harvard Business School Press, 1997.
5. Brad Feld and Jason Mendelson, Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist, Wiley; 4th edition, 1 October 2019.

Semester End Examination (A):

Theory:

Question paper based on the entire syllabus will comprise of 4 questions (All compulsory, but with internal choice as appropriate), each carrying 15 marks, total summing up to 60 marks.

Continuous Assessment (B):

Will consist of following three components:

- 1) Term Test 1 (based on 40 % syllabus) – 15 marks.
- 2) Term Test 2 (on next 40 % syllabus) – 15 marks.
- 3) Assignment / course project / group discussion / presentation / quiz – 10 marks

Total summing up to 40 marks.



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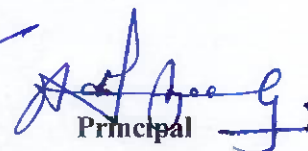
Checked by



Head of the Department



Vice-Principal



Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester: III		
Course: Professional and Business Communication Tutorial							Course Code: DJS23XHS233T				
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	Term Test 3	Total	
				--							
				Laboratory Examination			Term work			Total Term work	
--	--	2	1	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment			
				--	--		25	25	50		
50											

Prerequisite:

Foundational language proficiency and fundamentals of communication

Course Objectives: The objective of the course is

1. To inculcate professional and ethical attitude at the workplace
2. To enhance communication and interpersonal skills
3. To develop effective employability skills
4. To hone written skills for technical documentation

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

1. Apply group discussion techniques in professional situations
2. Use employability skills to optimize career opportunities
3. Employ storytelling techniques for effective presentation
4. Prepare technical documents using appropriate style, format, and language
5. Analyze the concept of professional ethics
6. Demonstrate interpersonal skills in professional and personal situations



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Detailed Syllabus:		
Unit	Description	Duration
1	Group Discussion • Purpose of a GD • Types of GD (topic based, case study based, etc.) • Criteria for evaluating GD • Dos and don'ts of GD	4
2	Employment Skills Resume Writing • Types of resumes • Structure • Content • Formatting of resume Interview Skills • Types and modes of interview • Preparation for interview • Dos and don'ts of interview • Frequently asked questions during interview	4
3	Communication for Professional Impact Corporate Storytelling • Elements of Storytelling • Types of Storytelling (Elevator pitch, product stories, event stories, stories in presentations, storytelling in SOPs and interviews, storytelling to manage conflict or to motivate) Virtual/Hybrid/Offline Presentation Techniques • Visual communication in presentations (Slide design principles) • Components of an effective presentation (Introduction, body, conclusion, Q & A session) • Audience engagement techniques (Opening strategies, interactive communication, body language etc.) • Group presentation skills (Collaborative preparation, transition between speakers, team coordination)	4
4	Technical Writing and Documentation Business Proposal Writing • Types of business proposals • Format of business proposal • Language and style Meeting Documentation • Planning of meetings • Conduction of meetings and observing meeting decorum • Drafting notice, agenda, and minutes of meeting	4



5	Professional Ethics • Ethics, values and professionalism • Responsible business practices • Value-driven leadership and decision-making	2
6	Interpersonal Skills Team Building • Team dynamics • Collaborative synergy • Strategies for high performance teams Negotiation Skills • Negotiation types • Process • Strategic communication techniques Leadership • Leadership competencies • Styles of leadership • Emotional intelligence and self-leadership Time Management • Planning and optimization • Productivity Strategies • Time Management Matrix, agile time management, deep work, pomodoro technique, attention and energy management, time audit etc.	8
Total		26

Professional and Business Communication Tutorial (DJS23XHS233T)	
Sr. No.	Tutorial Title
1	Group Discussion
2	Resume Building
3	Mock Interview - Peer Evaluation
4	Recruitment Readiness
5	Corporate Storytelling
6	Presentation Skills
7	Mock Meeting - Role play
8	Professional ethics - Case studies
9	Team Building
10	Leadership Skills
11	Negotiation Skills
12	Time Management



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A minimum of ten to twelve tutorials from the above-suggested list or any other based on the syllabus will be included, which would help the learner to apply the concept.

Alongside the tutorial-based assignments, students will be required to participate in a **Group Discussion competency assessment**.

Additionally, students will undertake a team based **mini project** involving the documentation and presentation of a Business Proposal.

Books Recommended:

Reference Books:

- Sanjay Kumar and Pushp Lata, Communicate to Conquer: A Handbook of Group Discussions and Job Interviews, Prentice Hall India Learning Private Limited, New Delhi, 2009
- Wendy Enlow and Lousie Kursmark, modernize your resume: Get noticed Get hired (Modernize your career), Emerald Career Publishing, North Carolina, 2016
- Sandeep Das, How Business Storytelling Works: Increase Your Influence and Impact, Penguin Random House India Pvt. Ltd., New Delhi, 2022
- Jacqueline Farrington, The Non-Obvious Guide to Better Presentations: How to Present Like a Pro (Virtually or in Person), Ideapress Publishing, Michigan, 2023
- Richard Johnson-Sheehan and Paul Thompson Hunter, Writing Proposals and Grants, Parlor Press, LLC, South Carolina, 2024
- Paul M. English, The Meeting Book: How the best companies meet better, John Wiley & Sons Inc, New Jersey, 2026
- Marianne M. Jennings, Business Ethics: Case Studies and Selected Readings, Cengage Learnings, Massachusetts, 2023
- Roy J. Lewicki and David M. Saunders, Negotiation, McGraw Hill, New York, 2025
- Ashley Herd, The Manager Method: A Practical Framework to lead, support and get results, Hay House Business, New York, 2026
- Oliver Burkeman, Four Thousand Weeks: Time Management for Mortals, Vintage, New York, 2022

Evaluation Scheme:

Tutorial: (Term work)

The Term work will consist of a minimum of ten to twelve tutorials, group discussion and mini project.



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

1. Tutorials (Performance of activities, Write-up): 25 marks
2. Group Discussion: 10 marks
3. Mini Project (Business Proposal and Presentation): 15 marks

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

Prepared by

Checked by

Head of the Department

Vice Principal

Principal

Shankar





Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester : III		
Course : Economics and Financial Management							Course Code: DJS23XHS234				
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	Assign- ment	Total	100
				60			15	15	10	40	
				Laboratory Examination			Term work				
2	--	--	2	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment	--		
				--	--	--	--	--		--	

Prerequisite:

1. Knowledge of Economics and Finance domain current affairs.

Course Objectives: The Objective of the course is

1. To describe the relationships among variables to analyse economic issues.
2. To Explain the function of the market and prices as an allocative mechanism.
3. To identify key macroeconomic indicators and measures of economic change, growth, and development
4. To understand basic concepts of financial management and their application in investment and financing decisions

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

1. Analyse individual decision making, how prices and quantities are determined in product and factor markets, microeconomic and macroeconomic outcomes
2. Analyse the performance and functioning of government, RBI, markets, and institutions in the context of social and economic problems.
3. Analyse the current economic status of India at global levels and provision in budget to address economic issues at national level.
4. Describe an understanding of the overall role and importance of the finance function.
5. Analyse financial performance and make appropriate inferences.

**Detailed Syllabus:**

Unit	Description	Duration
1	Introduction to Economics Fundamentals of Economics, Definition and scope of economics, the nature of the economic problem, finite resources and unlimited wants, definitions of the factors of production and their rewards, definition of opportunity cost, the influence of opportunity cost on decision making. Microeconomics and Macroeconomics The role of markets in allocating resources, the market system, introduction to the price mechanism, Demand, Supply and Price determination, Price elasticity of demand and supply (PED),	8
2	Role of Government and RBI Money, Banking, Households, Firms, economies and diseconomies of scale, Market Structure, Fiscal Policy, Monetary Policy, Economic Growth, causes and consequences of recession, causes of economic growth, measurement of economic growth inflation and deflation, living standards, indicators of living standards	4
3	Government Policies Last 20 years Journey of Indian Economy, Measures taken to grow Indian Economy, Meaning of India is the world's fifth-largest economy by nominal GDP and the third-largest by purchasing power parity (PPP), On a per capita income basis, India ranked 139th by GDP (nominal) and 127th by GDP (PPP) (Data reference year 2023), Comparison of top 5 largest economies in world, Discuss key points of India latest union budget and its impact on Indian economy and citizens, Meaning of Initiatives like Make in India, Digital India, Skill India etc. and expected impact on Indian Economy	4
4	Overview of Financial Management Fundamentals of financial management, principles and functions of the financial management, Strategy, methods, and techniques of the financial management, Overview of financial instruments, financial markets, financial Institutions	4
5	Overview of Financial Statements Balance Sheet, Profit and Loss Account, and Cash Flow Statement; Purpose of Financial Ratio Analysis; Liquidity Ratios; Efficiency or Activity Ratios; Profitability Ratios; Capital Structure Ratios; Stock Market Ratios;	8
Total		28

Books Recommended:**Text books:**

1. Datt & Sundharam's Indian Economy
by Gaurav Datt & Biswajit Nag, S. Chand Publications, 73rd Edition, 2024
2. Fundamentals of Financial Management by Prasanna Chandra, McGraw Hill Publications, 7th Edition, 2020



Reference Books:

1. Public Economics: The Macroeconomic Perspective by Burkhard Heer, Springer International Publications, 2019
2. Indian Economy: Economic Ideas, Development, and Financial Reforms by Raj Kumar Sen, Deep & Deep Publications, 2008
3. Indian Economy: Performance and Policies by Dr. V. C. Sinha, SBPD Publications, 2021
4. Financial Management by C. Paramasivan, T. Subramanian, New Age Publications, 2009
5. Financial Management Practices in India by Sandeep Goel, Taylor & Francis Publications, 2016

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper based on the entire syllabus total comprising of 60 marks.
2. Total duration allotted for writing the paper is 2 hrs.

Continuous Assessment (B):

Theory:

1. Term Test 1 (based on 40 % syllabus) of 15 marks for the duration of 45 min.
2. Term Test 2 (on next 40 % syllabus) of 15 marks for the duration of 45 min.
3. Term Test 3 can be conducted as Assignment/group discussion/ presentation/quiz /any other for 10 marks


Prepared by


Checked by


Head of the Department


Vice Principal


Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester: III		
Course: Community Engagement Service							Course Code: DJS23XEL201L				
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	Term Test 3	Total	
				--			--	--	--	--	--
				Laboratory Examination			Term work				25
	2	--	1	Oral	Practical	Oral & Pract ical	Labor atory Work	Tutorial / Mini project / presentation/ Journal/ Practical	Total Term work		
				--	--	--	--	--	25		

Prerequisite:

1. Fundamentals of core branch
2. Communication Skills

Objectives: The objective of the course is

1. To sensitize the student / learner into recognizing community level problems & challenges and give them an opportunity to engage in activities for solving the same.

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

1. Knowledge application: Applies knowledge understandings acquired from one's academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities.
2. Commitment for cause: Identify and experience commitment for community engagement activities that reinforce sense of belongingness and gratitude towards societal cause.
3. Diversity: Witness diversity in communities and cultures and demonstrate change in approach / attitude as, evidence of unconditional acceptance.
4. Team: Recognize, experience and value, effectiveness of working in a team, demonstrating co-existence of the roles - sincere worker and effective leader.



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Detailed Syllabus:	
Unit	Description
1	Open Activities • Participation in: blood donation camps organizer / donor, day-long tree plantation or afforestation / seed dispersal / cleanliness (water bodies, surrounding etc.) drives. • Literacy drives for children / youth / adults. One day hand holding activities in work-shop conduct for under privilege kids in the areas of – basic science, math, technical skill demonstration and building.
2	Technical (Program core related) • Cyber-crime, security awareness and vulnerabilities – sensitization, information dissemination and awareness sessions in indicated focus areas. Promotion and Sensitization for Sustainable living – focusing on solar power, water recycling, e-waste responsible disposal, waste recycling etc. in indicated focus areas. Focus areas: residential societies, schools, under-privileged areas, governments /private offices, and similar other establishments. OR Field Survey • Reporting on proactively conducted survey in the areas of resource management for – water, vegetables, electricity, crops etc.

Activities to be performed

Among the listed activities students are expected to complete one open activity mandatorily, and one technical (program core) OR field survey activity. The activities mentioned are exemplary in nature and any other additional activity of similar nature too can be undertaken by the learners, provided it is approved and endorsed by the faculty mentor / head of the department.

**Suggested Activities**

1. Undertaking cyber safety / security awareness sensitization drive / program especially for un-initiated students / individuals in schools / colleges / residential complex / offices etc. Typical suggested tabulation.

Participant No.	Name	Age	School/ College/ Residence/ Office	Email	Contact Number	Awareness Level	Remarks

2. Energy / Power assessment for establishments (societies, schools, colleges, residential complex, shops etc.) involving computing power devices ratings, power consumption over operating period, calculating energy cost from tariff card / rates for every group of appliances / devices or equipment. Typical suggested tabulation pattern.

Device/Appliance Group	Number of appliances / devices	Power Rating (kW)	Operating Hours (h/day)	Energy Consumption (kWh/day)	Tariff Rate (Rs. / kWh)	Energy Cost (Rs.)
Lighting Fixtures						
Ceiling Fans						
Air Conditioner (AC)						
Security Systems						
Water Pump						

3. Traffic light monitoring viz-e-viz average traffic density on road. Analyzing the data and commenting on results. Evaluating and comparing impact on road repairs related lane blockage and proportional recommendation for lights timing variations. Typical suggested tabulation pattern.

Sr. No.	Timestamp	Traffic Density	Traffic Light Status	Road Repair Status	Remarks



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4. Help compute green footprint of select number of household (per member) - say 10 houses of 3+ members. This is for evaluating dependence upon non green energy sources and habits and changes in lifestyle for attempts at their reductions. Learners are encouraged to use typically available online carbon-footprint calculators. The table herewith maybe used for reference calculations.

House No.	House hold Name	Number of Members	Energy Usage (kWh)	Water Usage (liters)	Waste Production (kg)	Transportation Habits	Green Footprint

5. Compulsion of having a 'borewell for non-potable water supply in city residential complexes is a modern-day rule. Increased pace of re-development, as well as number of occupants in given area, has resulted in increased number of borewells being dug within and outside city limits.

Reduced yield, quality and quantity of water adds to the recurring maintenance cost of borewells, especially in the city areas. Poor water recharge systems along-with depleting open soil cover area in wake of wall-to-wall of concrete carpet aggravate the problem. Study, analyse and report a residential society's - capacity of water requirement, present day borewells in action, approximate yield, maintenance cost and frequency, borewell flushing iterations in wake of redevelopment in neighborhood. A typical tabulation mechanism for inferences can be as below:

Borewell No.	Location	Depth (ft)	Yield (Liters/Day)	Water Quality	Maintenance Cost (Rs.)	Remarks

[Handwritten signature]



6. Detection of Adulteration in food / fruits / vegetables / milk / mava /saffron etc. or contamination of potable drinking water.

Ex. Adulteration in fruits could be apple waxing, injecting chemicals in watermelon, pomegranate etc. to give it a bright red color, artificial ripening of mangos etc.

For a given activity, samples from more than one area, specifically from mofussil /interiors / 'gaothans' etc, may be obtained, to evaluate sample purity or extent of adulteration. Learners are encouraged to use online resources provided by 'Food Safety and Standards Authority of India' (*fssai*), for handholding in requisite procedures.

YouTube link:

Food Safety and Standards Authority of India: goo.gl/Y8Lzbu

Ex. 1 Milk Adulteration:

<https://www.youtube.com/watch?v=pbnmeRUBxKk>

Ex.2 Watermelon Adulteration:

<https://www.youtube.com/watch?v=yrLAj7oJies>

Product	Adulterant	Testing Method	Result	Remarks

Certificates and Formats:



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Activity Endorsement Certificate

Date:

Community engagement service is a mandatory course, of two credits, introduced at second year of engineering under the autonomous structure of the institute.

Course objective: To sensitize the student / learner into recognizing social problems & challenges and give them an opportunity to engage in activities for solving the same.

Course outcomes:

1. Knowledge application: Applies knowledge understandings acquired from one's academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities.
2. Commitment for cause: Identify and experience commitment for community engagement activities that reinforce sense of belongingness and gratitude towards societal cause.
3. Diversity: Witness diversity in communities and cultures and demonstrate change in approach / attitude as an evidence of unconditional acceptance.
4. Team: Recognize, experience and value effectiveness of working in a team, demonstrating co-existence of the roles - sincere worker and effective leader.

This is to certify that Mr./Ms. _____ bearing
SAP ID _____ is a student of S.Y. B.Tech., _____ branch of
engineering. He / She is a bonafide student of SVKM's Dwarkadas J. Sanghvi College of
Engineering, Mumbai. He / She is reliable, sincere, hardworking and capable of conducting
_____ activity in your premises. We request you to kindly allow for the conduction of
the activity and we also solicit your earnest co-operation in the same.

Signature

Name of Department Head:



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Disclaimer

(This form must be read, signed, and submitted prior to the beginning of the community service activity.)

Student Details	Activity Details
Name	
SAPID	Date
Program	Time
Class/Div	Address

I, the undersigned _____ accept the following terms and conditions unconditionally:

1. I accept and understand that the community activity identification and selection has been done willingly by me.
2. I undertake to convey that, I am apparently in good health and well-being, and suffer no physical impairment that would or should prevent my participation in the activity.
3. I undertake to bear all related expenses and risk of travel related to the activity and shall not hold any personnel from the institute responsible with regards to claims and / or loss in the process of conduct of activity.
4. I undertake that my parents or legal/local guardians are aware of said activity and agree to above mentioned terms and conditions.

Student's name & signature: _____

Parent or Guardian's name & signature: _____



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Guidelines for Assessment of the work

- The review/progress monitoring committee shall be constituted by the Head of the Department. The progress of selected/assigned activities is to be evaluated on a continuous basis, holding at-least one review in the 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.
- Each group needs to submit following forms to respective supervisor after conducting both the activities,
 - o Activity Conduction Report
 - o Participant Feedback (online / offline)
 - o Participant Attendance (online / offline)
 - o Survey Report
 - o Participation certification

Forms for Technical Activity:

1. Activity Conduction Report

Sr. No.	Name of the Activity	
1	Date of Activity	
2	Activitytype Open / Technical	
3	Activity objectives	
4	Place of Activity	
5	SAP id and Names of students	
6	Name of the Association	
7	Activity description	
8	No. of participants	
9	Photos (Geo tagged)	



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1. Participant feedback (online / offline):

Sr. No.	Indicators	Scale: 1 (Lowest) to 5 (Highest)
1	The objectives of the training were clearly defined.	
2	The content was organized and easy to follow.	
3	This training experience will be useful to me.	
4	The trainer was knowledgeable about the training topics.	
5	The training objectives were met	

Evaluation Scheme:

Continuous Assessment (A):

Term Work: - 25 marks, distribution as herewith:

1. Rubric for Open Ended Activity (10 marks)

- Participation certificate/proof

2. Rubric for Technical Activity (15 marks)

Sr. No.	Performance Indicators (Maximum marks per indicator are given in bracket)	Marks
1	Pre-requisite documents (permission letter, presentation material, permission letters, etc.) [05 marks]	
2	Participant Feedback [05 marks]	
3	Participant attendance [05 marks]	
	TOTAL	

OR



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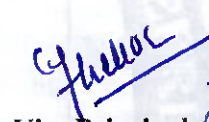
2. Rubric for Field Survey Activity:

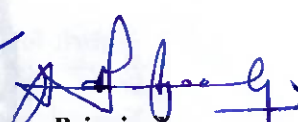
Sr. No.	Performance Indicators (Maximum 03 marks per indicator)	Marks
1	Topic selection	
2	Survey preparation	
3	Field work	
4	Analysis	
5	Report writing	
	TOTAL	


Prepared by


Checked by


Head of the Department


Vice Principal


Principal



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Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester: III		
Course: Innovative Product Development I							Course Code: DJS23XSC201P				
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	Term Test 3	Total	—
				—			—	—	—	—	
				Laboratory Examination			Term work				
—	2	—	1	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment	25		
—	—	—	—	—	—	—	—	—		25	

Prerequisite:

Nil

Objectives: The objective of the course is

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.

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

1. Identify the requirement for a product based on societal/research needs.
2. Apply knowledge and skills required to solve a societal need by 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.



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5. Develop interpersonal skills, while working as a member of the team or as the leader.
6. Demonstrate capabilities of self-learning as part of the team, leading to life-long learning, which could eventually prepare themselves to be successful entrepreneurs.
7. Demonstrate product/project management principles during the design and development work and also excel in written (Technical paper preparation) as well as oral communication.

Guidelines for the proposed product design and development:

- Students shall form a team of 3 to 4 students (max allowed: 5-6 in extraordinary cases, subject to the approval of the department review committee and the Head of the department).
- Students should carry out a survey and identify the need, which shall be converted into conceptualization of a product, in consultation with the faculty supervisor/head of department/internal committee of faculty members.
- Students in the team shall understand the effective need for product development and accordingly select the best possible design in consultation with the faculty supervisor.
- Students shall convert the best design solution into a working model, using various components drawn from their domain as well as related interdisciplinary areas. Faculty supervisor may provide inputs to students during the entire span of the activity, spread over 2 semesters, wherein the main focus shall be on self-learning.
- A record in the form of an activity log-book is to be prepared by each team, wherein the team can record weekly progress of work. The guide/supervisor should verify the recorded notes/comments and approve the same on a weekly basis.
- The design solution is to be validated with proper justification and the report is to be compiled in a standard format and submitted to the department. Efforts are to be made by the students to try and publish a technical paper, either in the institute journal, "Techno Focus: Journal for Budding Engineers" or at a suitable publication, approved by the department research committee/ Head of the department.
- The focus should be on self-learning, capability to design and innovate new products as well as on developing the ability to address societal problems. Advancement of entrepreneurial capabilities and quality development of the students through the year long course should ensure that the design and development of a product of appropriate level and quality is carried out, spread over two semesters, i.e. 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 the 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 during the semester shall be as given below:
- Marks awarded by the supervisor based on performance of student: 10



- Marks awarded by review committee: 10
- Quality of the write-up: 5

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.

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 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 Examiners,

Prepared by

Checked by

Head of the Department

Vice Principal

Principal



Program: B.Tech in Computer Science and Engineering(IoT and Cybersecurity with Block chain Technology)							S.Y.B.Tech		Semester: III		
Course: Python for Intelligent Data Analytics							Course Code: DJS23BSC201				
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	Term Test 3	Total	40
				60			15	15	10	40	
				Laboratory Examination			Term work			Total Term work	
1	--	--	1	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/ Assignment			--
				--	--	--	--	--	--		

Coursera Course: Python for Data Science, AI &

Development Link:

<https://www.coursera.org/programs/nmims-university-faculty-development-program-kjd4b/learn/python-for-applied-data-science-ai?authProvider=nmims&source=search>

Number of hours: 25 Hrs,

Beginner level

About the Course:

Kickstart your Python journey with this beginner-friendly, self-paced course taught by an expert. Python is one of the most popular programming languages, and the demand for individuals with Python skills continues to grow.

This course takes you from zero to programming in Python in a matter of hours—no prior programming experience is necessary! You'll begin with Python basics, including data types, expressions, variables, and string operations. You will explore essential data structures such as lists, tuples, dictionaries, and sets, learning how to create, access, and manipulate them. Next, you will delve into logic concepts like conditions and branching, learning how to use loops and functions, along with important programming principles like exception handling and object-oriented programming. As you progress, you will gain practical experience reading from and writing to files and working with common file formats. You'll also use powerful Python libraries like NumPy and Pandas for data manipulation and analysis. The course also covers APIs and web scraping, teaching you how to interact with REST APIs using libraries like requests and extract data from websites using BeautifulSoup. You will practice and apply what you learn through hands-on labs using Jupyter Notebooks. By the end of this course, you'll feel comfortable creating basic programs, working with data, and automating real-world tasks using Python. This course is suitable for individuals interested in pursuing careers in Data Science, Data Analytics,



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Software Development, Data Engineering, AI, and DevOps and a variety of other technology-related roles.

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

1. Develop a foundational understanding of Python programming by learning basic syntax, data types, expressions, variables, and string operations.
2. Apply Python programming logic using data structures, conditions and branching, loops, functions, exception handling, objects, and classes.
3. Demonstrate proficiency in using Python libraries such as Pandas and Numpy and developing code using Jupyter Notebooks.
4. Access and extract web-based data by working with REST APIs using requests and performing web scraping with BeautifulSoup.

Detailed Syllabus:		
Unit	Description	Duration
1	Python Basics Introduction to Python, Jupyter, Types, Expressions and Variables, String Operations, Conclusion.	3
2	Python Data Structures Lists and Tuples, Dictionaries, Sets, Conclusion.	3
3	Python Programming Fundamentals Conditions and Branching, Loops, Functions, Exception Handling, Objects and Classes, Conclusion.	6
4	Working with Data in Python Reading Files with Open, Writing Files with Open, Pandas: Loading Data, Pandas: Working with and Saving Data, One Dimensional Numpy, Two Dimensional Numpy, Conclusion	6
5	APIs and Data Collection Application Program Interface, REST APIs & HTTP Requests, HTML for Web Scraping, Web Scraping, Working with Different File Formats, Conclusion.	7
Total		25

Evaluation Scheme:

1. The identified courses shall focus on developing AI-related competencies and skills among students. Each selected course shall carry one (1) credit.
2. Faculty members shall act as mentors for the Coursera courses identified for various semesters of the program.
3. One faculty mentor shall be assigned to each division of the program for effective coordination and monitoring of this activity.
4. The assigned faculty mentor shall complete and review the course content before assigning the course to students.
5. The term work for these one-credit courses shall form a part of the Internal Continuous Assessment (ICA) component.
6. The Term work (ICA) component shall carry **40 marks**



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

- **15 Marks:** Coursera Course Completion and Certification
- **15 Marks:** Faculty-curated evaluation conducted through the Coursera platform
- **10 Marks:** Internal faculty evaluation through quizzes, assignments, presentations, or Project

[Signature] *[Signature]* *[Signature]* *[Signature]* *[Signature]*
Prepared by Checked by Head of the Department V'ce Principal Principal