



SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar

NAAC 'A' Grade (10-01-2023 To 09-01-2028)

NEP-2020 aligned Curriculum with effect from Academic Year 2026-27

M. Sc. (Information Technology) Semester I

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT01	Python Programming	4-0-0	120	04

• Course Learning Outcomes (CLOs)

On completion of this course, students will be able to:

CLO1: Apply the basic concepts of Python programming to solve practical problems.

CLO2: Demonstrate the use of aggregate data types along with their operations.

CLO3: Utilize composite data types and implement functions for modular programming.

CLO4: Develop programs incorporating exception handling techniques for robust and error-free execution.

CLO5: Apply advanced Python concepts including object-oriented programming, file handling, modules, and basic GUI/database applications.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Introduction to Python - Brief history, key characteristics - Advantages & Python Application Areas - Syntax overview, comments, naming conventions - Primitive data types, data type constructors - Operators - Console input and output - Control structures - Ancient Indian contributions to logic and computation - Relevance of IKS in modern programming	Classroom Lectures, Seminars, ICT-Enabled Learning, Problem-Based Learning, Self-Directed Learning	CLO1
II	Aggregate Data Types - Sequence types: lists, tuple, range - Common operations on sequences - Operations on lists - Using tuples and ranges - Text sequence type: str - Operations on strings	Classroom Lectures, Seminars, ICT-Enabled Learning, Demonstration Method, Problem-Based Learning, Collaborative Learning	CLO2
III	Composite Data Types, Functions and Exception Handling - Mapping type : dict - Set type: set - Functions - Exception handling	Classroom Lectures, Seminars, ICT-Enabled Learning, Problem-Based Learning, Case-Based Learning (error handling scenarios)	CLO3, CLO4



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IV	Additional Features of Python - Object-oriented programming in Python - File handling in Python - Modules and packages - Introduction to GUI applications and database connectivity	Classroom Lectures, Seminars, ICT-Enabled Learning, Experiential Learning	CLO5
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• **Assessment Methodologies**

(A) Internal Assessment

(a) Internal Formative assessment (20 Marks)

- i. Assignment, Self-learning and Term work
- ii. Seminar / Presentation
- iii. Quizzes

(b) Internal Summative Assessment (30 Marks)

- i. Mid-term Test

(B) External Examination (50 Marks)

(a) Term-end Examination

(C) Weightage of Learning Efforts for External Assessment

Unit	Aligned Cos	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	CLO1	32	4	5	3	12
II	CLO2	28	3	4	5	12
III	CLO3, CLO4	30	2	4	6	12
IV	CLO5	30	1	4	9	14
		120	10	17	23	50

• **Assessment and Evaluation**

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Seminars, Assignments, Quizzes, Class Regularity, Internal test	50
2	End-Semester Examination	Written Exam	50



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(D) CLOs – PLOs Matrix

CLO	PLO									
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	2	1	–	–	1	1	–	1
CLO2	3	2	2	1	1	–	1	–	–	1
CLO3	3	2	3	2	1	1	2	1	–	1
CLO4	3	2	3	2	1	1	2	1	–	2
CLO5	3	3	3	3	2	2	2	2	1	2

• Suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Core Python Programming	Rao, R. Nageswara	2nd Edition, 2018	Dreamtech Press
2	Learning Python	Lutz, Mark	5th Edition, 2013	O'Reilly
3	Programming in Python 3: A Complete Introduction to the Python Language	Summerfield, Mark	2nd Edition, 2018	Pearson Education
4	Introduction to Computation and Programming Using Python	Guttag, John V.	2nd Edition, 2016	The MIT Press
5	Professional Python	Sneeringer, Luke	2015	Wiley
6	Introduction to Programming in Python	Sedgewick, Robert; Wayne, Kevin; Dondero, Robert	2015	Addison-Wesley Professional

• Online Resources (Open Source)

Sr. No.	Description of Resource(s)	Web link
1	Interactive platform for learning Python basics, syntax, data types, control structures, and functions	https://www.learnpython.org/
2	Comprehensive course covering Python from beginner to advanced level including OOP and file handling	https://www.freecodecamp.org/learn/scientific-computing-with-python/
3	Detailed tutorials with examples on Python concepts such as lists, strings, functions, and data structures	https://www.geeksforgeeks.org/python-programming-language/
4	Structured guide explaining Python fundamentals, data handling, and advanced features	https://brainstation.io/learn/python
5	Official Python documentation providing in-depth reference for syntax, libraries, modules, and advanced topics	https://docs.python.org/3/



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6	Interactive coding platform with real-time feedback for learning Python concepts and debugging	https://futurecoder.io/
7	Academic-oriented Python course covering fundamentals, problem-solving, and practical applications	https://www.netacad.com/courses/programming/python-programming-essentials-python
8	Beginner-friendly tutorials with simple explanations and live coding examples	https://www.w3schools.com/python/
9	IKS Division, Ministry of Education	https://iksindia.org



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M. Sc. (Information Technology) Semester I

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT02	Database Management Systems	4-0-0	120	04

• Course Learning Outcomes (CLOs)

On completion of this course, students will be able to:

CLO1: Apply basic concepts of DBMS, relational model, ER model, and normalization techniques.

CLO2: Analyze database design principles including data independence, integrity, security, and user roles.

CLO3: Apply SQL commands (DDL, DML, DCL) to create and manipulate databases.

CLO4: Construct complex SQL queries using joins, subqueries, and set operations.

CLO5: Develop PL/SQL programs using control structures, database objects, cursors, procedures, functions, triggers and packages.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Introduction <ul style="list-style-type: none"> - Database Management System (DBMS) Concepts - Relational Database Model - Codd rules - The Entity-Relationship (ER) Model - Concepts of Data Independence, Data Sharing, Data Integrity, - Data Protection, System Catalog - Users associated with database systems and their roles - Normalization and De-Normalization - Knowledge organization in Vedas and Puranas - Structured storage in scriptures 	Classroom Lectures, ICT-Enabled Learning, Self-Directed Learning	CLO1, CLO2
II	Structured Query Language (SQL) <ul style="list-style-type: none"> - Introduction to SQL - SQL sublanguages – DDL, DML, DCL - Basic data types - SQL statements: Create, Select, Insert, Delete, Update etc. - Database constraints - Built-in functions 	Classroom Lectures, ICT-Enabled Learning, Problem-Based Learning (PBL), Hands-on Practice	CLO3
III	SQL and PL/SQL <ul style="list-style-type: none"> - Sub queries - Joins and its types - Set operations 	Classroom Lectures, ICT-Enabled Learning	CLO4, CLO5



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	<ul style="list-style-type: none"> - Database objects: View, Index, Sequence, Synonym etc. - PL/SQL – introduction and its features - PL/SQL block structure - Control structures 	,Problem-Based Learning (PBL), Collaborative Learning, Lab Practice	
IV	Advanced PL/SQL <ul style="list-style-type: none"> - Exception handling - Cursors - Stored procedures and stored functions - Database triggers - Packages 	Classroom Lectures, ICT-Enabled Learning, Experiential Learning	CLO5

• Assessment Methodologies

(E) Internal Assessment

(a) Internal Formative assessment (20 Marks)

- i. Assignment, Self-learning and Term work
- ii. Seminar / Presentation
- iii. Quizzes

(b) Internal Summative Assessment (30 Marks)

- i. Mid-term Test

(F) External Examination (50 Marks)

(a) Term-end Examination

(G) Weightage of Learning Efforts for External Assessment

Unit	Aligned COs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/Analyse & above (A)	
I	CLO1, CLO2	32	4	5	3	12
II	CLO3	28	3	4	5	12
III	CLO4, CLO5	28	2	4	6	12
IV	CLO5	32	1	3	10	14
		120	10	16	24	50

• Assessment and Evaluation

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Seminars, Assignments, Quizzes, Class Regularity, Internal test	50
2	End-Semester Examination	Written Exam	50



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(H)CLOs – PLOs Matrix

CLO	PLO									
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	–	–	–	–	1	–	–	–
CLO2	3	3	1	1	–	1	1	–	2	–
CLO3	3	2	3	1	–	–	1	1	1	1
CLO4	3	3	3	2	1	–	1	1	–	–
CLO5	3	3	3	3	1	2	2	2	2	1

• Suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	SQL, PL/SQL: The Programming Language of Oracle	Ivan Bayross	4th Edition, 2023	BPB Publications
2	Oracle 9i: A Beginner's Guide	Oracle Press	1st Edition, 2002	Tata McGraw Hill (TMH)
3	Fundamentals of Database Systems	Elmasri; Navathe	7th Edition, 2016	Pearson Education
4	An Introduction to Database Systems	Desai, Bipin C.	1st Ed., 2012	Galgotia Publication Pvt. Ltd.
5	The Complete Reference SQL	Groff; Weinberg	3rd Edition, 2010	Tata McGraw Hill
6	Oracle PL/SQL Programming	Feuerstein; Pribyl	5th Edition, 2009	O'Reilly
7	An Introduction to Database Systems	Date, C. J.	8th Edition, 2004	Pearson Education
8	Database System Concepts	Silberschatz; Korth; Sudarshan	6th Edition, 2010	McGraw Hill International
9	Beginning Oracle Programming	Dillon; Beck; Kyte	2004	Apress

• Online Resources (Open Source)

Sr. No.	Description of Resource(s)	Weblink
1	Interactive tutorials for SQL and DBMS concepts including queries, joins, and normalization	https://www.w3schools.com/sql/
2	Comprehensive DBMS and SQL tutorials with examples and practice problems	https://www.geeksforgeeks.org/dbms/



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3	Official Oracle documentation for SQL and PL/SQL concepts, syntax, and advanced features	https://docs.oracle.com/en/database/
4	Free interactive SQL practice platform with real-time query execution	https://www.sqlzoo.net/
5	Hands-on SQL learning platform with exercises and quizzes	https://www.sqlcourse.com/
6	Video-based and practical DBMS/SQL learning resources	https://www.freecodecamp.org/learn/
7	IKS Division, Ministry of Education	https://iksindia.org



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M. Sc. (Information Technology) Semester I

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT03	Artificial Intelligence	4-0-0	120	04

• Course Learning Outcomes (CLOs)

On completion of this course, students will be able to:

CLO1: Apply basics of Artificial Intelligence.

CLO2: Apply AI-based search techniques to solve simple real-life problems.

CLO3: Develop fuzzy rule-based systems.

CLO4: Implement basic connectionist models to solve classification or prediction problems.

CLO5: Design evolutionary solutions for optimisation and scheduling problems.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Artificial Intelligence (AI) and Knowledge Based Systems (KBS) <ul style="list-style-type: none"> – Natural and Artificial Intelligence – Testing Intelligence with the Turing Test, Application Areas of Artificial Intelligence, Data Pyramid – Production systems and AI Based Searches like Hill Climbing and Heuristic Search – KBS Structure, Components of KBS, Categories of KBS, Knowledge-Based Shell, Advantages, Limitations and Applications of KBS – Knowledge Acquisition, Knowledge Update – Factual and Procedural Knowledge Representations – Dharma-based ethics and responsible use of technology – Rule-based systems in ancient texts 	Classroom Lectures, Seminars, Case-Based Learning, ICT-Enabled Learning	CLO 1 CLO 2
II	Fuzzy Logic <ul style="list-style-type: none"> – Fuzzy Logic and Fuzzy Sets, Membership Functions – Fuzzification and Defuzzification – Operations on Fuzzy Sets – Fuzzy Functions and Linguistic Variables – Fuzzy Relations, Propositions and Connectives – Fuzzy Inference – Fuzzy Rules, Fuzzy Control System and Fuzzy Rule Based Systems 	Classroom Lectures, Seminars, Case-Based Learning, ICT-Enabled Learning	CLO 3
III	Connectionist Models <ul style="list-style-type: none"> – Introduction to ANN, Biological Neuron and Artificial Neuron – Hopfield model of ANN, Parallel Relaxation – Linearly Separable Problems, Single Perceptron, Fixed Increment Perceptron Learning – Non Linearly Separable problems and Multi Layer Perceptron – Applications of ANN and Use Cases 	Classroom Lectures, Seminars, Case-Based Learning, ICT-Enabled Learning	CLO 4



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IV	Genetic Algorithms	Classroom Lecture, Seminars, Case-Based Learning, ICT-Enabled Learning	CLO 5
	<ul style="list-style-type: none"> - Introduction to Genetic Algorithm (GA) - Fundamental Concepts of GA: Gene, Population, Fitness Functions, Generations - Encoding Strategies, Genetic Operators, Fitness Functions - Typical Genetic Algorithm Cycle - Function Optimisation, Designing Special Operators and Edge Recombination, Travelling Salesman Problem - Schema, Genetic programming 		

• Assessment Methodologies

(I) Internal Assessment

(a) Internal Formative assessment (20 Marks)

- i. Assignment, Self-learning and Term work
- ii. Seminar / Presentation
- iii. Quizzes

(b) Internal Summative Assessment (30 Marks)

- i. Mid-term Test

(J) External Examination (50 Marks)

(a) Term-end Examination

(K) Weightage of Learning Efforts for External Assessment

Unit	Aligned COs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	CLO 1 CLO 2	40	1	1	12	14
II	CLO 3	26	1	1	10	12
III	CLO 4	27	1	1	10	12
IV	CLO 5	27	1	1	12	12
		120	04	04	44	50

• Assessment and Evaluation

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Seminars, Assignments, Quizzes, Class Regularity, Internal test	50
2	End-Semester Examination	Written Exam	50



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(L) CLOs – PLOs Matrix

CLO \ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	-	2	-	-	1	-	1	1
CLO2	3	3	2	2	1	-	1	-	-	1
CLO3	2	2	3	3	2	1	1	-	-	1
CLO4	3	2	3	3	3	1	1	-	-	2
CLO5	2	3	3	3	2	2	1	1	-	2

• Suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition /Year	Publisher
1	Artificial Intelligence	Rich and Knight	2018	Tata McGraw-Hill Publishing Co. Ltd.
2	Knowledge-Based Systems	Rajendra Akerkar, Priti Sajja	2010	Jones & Bartlett Learning
3	Neural Network, Fuzzy Logic and Genetic Algorithms	Vijyalaxmi Pai and Rajasekaran	2011	Prentice Hall of India

• Online Resources (Open Source)

Sr. No.	Description of Resource(s)	Weblink
1	IKS Division, Ministry of Education	https://iksindia.org



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M. Sc. (Information Technology) Semester I

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT04	Computer Networks	4-0-0	120	04

• Course Learning Outcomes (CLOs)

On completion of this course, students will be able to:

CLO1: Describe the classification of computer networks, transmission media, networking devices, analyze protocol hierarchies, design issues, and compare OSI and TCP/IP reference models.

CLO2: Critically assess routing techniques, congestion control strategies, and internetworking issues.

CLO3: Apply concepts of IP addressing, TCP/UDP protocols, and subnetting.

CLO4: Explain wireless LAN protocols, mobile systems, and satellite communication technologies

CLO5: Differentiate between substitution and transposition ciphers, secret-key and public-key algorithms, and apply cryptographic principles. Design secure communication systems using firewall and techniques.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Introduction and Data Communication Fundamentals - Introduction to computer networks - Classification of computer networks - Transmission media: guided and unguided media. - Functions of network connecting devices: Amplifier, Repeater, Bridge, Hub, Switch, Router, Gateway, Modems - Data transmission concepts : transmission modes, multiplexing, switching technologies, asynchronous and synchronous transmission - Introduction to Local Area Networks (LANs), LAN topologies, - Gigabit Ethernet - Decentralized governance (Mahajanapadas) as network models - Communication systems in ancient India (messenger systems, symbols)	Classroom Lectures, Seminars, ICT-Enabled Learning , Diagram-based Teaching	CLO1
II	Layered Protocols - Protocols, Protocol hierarchies - Design issues for the layers - The OSI reference model and the TCP/IP reference model - The Internet Protocol (IP), IP addresses, Subnets, - Introduction to Transmission Control Protocol (TCP), The TCP segment header - Introduction to User Datagram Protocol (UDP)	Classroom Lectures, Seminars, ICT-Enabled Learning Comparative Analysis, Problem Solving	CLO1, CLO3



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III	Routing, Congestion Control and Internetworking - Virtual Circuits and Datagrams - Routing Techniques - Congestion Control - Introduction and Issues that arise in Internetworking - Fragmentation - Tunneling - Virtual Private Networks	Classroom Lectures, Seminars, ICT-Enabled Learning	CLO2
IV	Wireless Communication and Network Security - Introduction to Wireless Networks - Satellite Communication (LEO, MEO, GEO) - Wireless LAN protocols - Introduction to Mobile Telephone Systems, Cell Fundamentals - Traditional Cryptography, Substitution Cipher vs Transposition Cipher, Fundamental Cryptographic Principles - Secret-Key Algorithms vs Public-Key Algorithms - Firewalls	Classroom Lectures, Seminars, ICT-Enabled Learning, Demonstration, Real-life Examples, Security Case Studies	CLO4, CLO5

• **Assessment Methodologies**

(M) **Internal Assessment**

(a) **Internal Formative assessment (20 Marks)**

- i. Assignment, Self-learning and Term work
- ii. Seminar / Presentation
- iii. Quizzes

(b) **Internal Summative Assessment (30 Marks)**

- i. Mid-term Test

(N) **External Examination (50 Marks)**

(a) **Term-end Examination**

(O) **Weightage of Learning Efforts for External Assessment**

Unit	Aligned COs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/Analyse & above (A)	
I	CLO1	30	4	5	3	12
II	CLO1, CLO3	32	3	5	4	12
III	CLO2	28	2	4	6	12
IV	CLO4, CLO5	30	1	4	9	14
		120	10	18	22	50



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- Assessment and Evaluation

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Seminars, Assignments, Quizzes, Class Regularity, Internal test	50
2	End-Semester Examination	Written Exam	50

(P) CLOs – PLOs Matrix

CLO	PLO									
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	3	2	1	–	–	1	–	–	–
CLO2	3	3	2	2	–	1	1	–	2	–
CLO3	3	3	3	1	–	–	1	1	–	–
CLO4	3	2	–	2	–	–	1	–	–	–
CLO5	3	3	3	2	1	2	2	1	3	1

- Suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Computer Networks	Tanenbaum A. S.	5th Edition / 2019 (Originally 2002)	Prentice-Hall of India Pvt. Ltd., New Delhi
2	Data Communications and Networking	Forouzan B. A.	5th Edition / 2013	Tata McGraw-Hill
3	Data and Computer Communications	Stallings W.	10th Edition / 2014	Macmillan Publication Company, New York
4	Computer Networking: A Top-Down Approach	Kurose J. F., Ross K. W.	7th Edition / 2017	Pearson Education
5	Networking Essentials	Jeffrey S. Beasley, Piyasat Nilkaew	3rd Edition / 2012	Pearson
6	Computer Networks and Internets	Douglas E. Comer	6th Edition / 2014	Pearson
7	Introduction to Computer Networks	Larry L. Peterson, Bruce S. Davie	5th Edition / 2011	Morgan Kaufmann
9	Network Security Essentials	William Stallings	6th Edition / 2016	Pearson
10	Cryptography and Network Security	William Stallings	7th Edition / 2017	Pearson



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• Online Resources (Open Source)

Sr. No.	Description of Resource(s)	Weblink
1	Computer Networking Basics – TutorialsPoint	https://www.tutorialspoint.com/computer_networking
2	Data Communication and Networking Notes – GeeksforGeeks	https://www.geeksforgeeks.org/computer-network-tutorials/
3	OSI Model and TCP/IP – Study Material	https://www.javatpoint.com/osi-model
4	IP Addressing and Subnetting Guide	https://www.geeksforgeeks.org/ip-addressing-and-subnetting/
5	Routing Algorithms and Networking Concepts	https://www.tutorialspoint.com/data_communication_computer_network
6	Wireless Communication Basics	https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/what-is-wifi.php
7	Cryptography and Network Security Basics	https://www.geeksforgeeks.org/cryptography-and-its-types/
8	Firewall Concepts and Types	https://www.cisco.com/c/en/us/products/security/firewalls/what-is-a-firewall.html
9	IKS Division, Ministry of Education	https://iksindia.org



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Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT05	Computer Fundamentals	2-0-0	60	02

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Apply the basic concepts of computer organization and analyze number systems, operating systems, process management, CPU scheduling algorithms, and memory management techniques.

CLO2: Evaluate linear and non-linear data structures for problem-solving.

CLO3: Apply searching and sorting algorithms to solve computational problems efficiently.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Fundamentals of Computer Organization and Operating Systems <ul style="list-style-type: none"> - Block diagram of a simple computer and its different functional units - Number systems and conversion - Concept of zero (Shunya) - Decimal number system (origin in India) - Binary-like representations in Pingala's Chandashastra - Representation of information, character codes - Understanding the role of operating systems - Operating system services - The concept of a process, Scheduling of processes - CPU scheduling - Introduction - Introduction to memory management and Virtual memory - Early computation methods (Vedic mathematics basics) 	Interactive Lectures, ICT – based learning, Problem-Based Learning	CLO1
II	Fundamentals of Data Structures <ul style="list-style-type: none"> - Linear and non-linear data structures - Arrays, stacks, queues, linked lists, Binary Tree: concept & examples - Hashing techniques - Searching and Sorting techniques ; Linear Search, Binary Search, Bubble Sort 	Interactive Lectures, ICT – based learning, Problem-Based Learning	CLO2, CLO3

- **Assessment Methodologies**

(Q) Internal Assessment

(a) Internal Formative assessment (20 Marks)

- i. Assignment, Self-learning and Term work
- ii. Seminar / Presentation
- iii. Quizzes



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M. Sc. (Information Technology) Semester I

(b) Internal Summative Assessment (30 Marks)

i. Mid-term Test

(R) External Examination (50 Marks)

(a) Term-end Examination

(S) Weightage of Learning Efforts for External Assessment

Unit	Aligned CLOs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/ Analyse & above (A)	
I	CLO1	30	4	5	4	13
II	CLO2, CLO3	30	4	4	4	12
		60	8	9	8	25

• Assessment and Evaluation

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Seminars, Assignments, Quizzes, Internal test	50
2	End-Semester Examination	Written Exam	50

(T) CLOs – PLOs Matrix

CLO	PLO									
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	3	1	-	-	-	-	2	-	1
CLO2	2	3	3	1	-	-	-	-	-	-
CLO3	2	2	3	-	-	-	-	-	-	1

Suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Structured Computer Organization	Tanenbaum A. S.	6 th Edition / 2016	Pearson
2	Operating System Concepts	Silbetschatz, Galvin, Gagne	8 th Edition / 2008	John Wiley and Sons, Inc.
3	An Introduction to Data Structures with Applications	Tremblay J. & Sorenson P. G.	2 nd Edition / 2017	McGraw-Hill International Edition



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4	Introduction to Data Structures	Singh Bhagat & Naps Thomas	1 st Edition / 2008	Tata McGraw-Hill Publishing Co. Ltd.
5	Microprocessors and Interfacing - Programming and Hardware	Hall Douglas V.	3 rd Edition / 2017	McGraw Hill

• **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Computer Fundamentals Tutorials by GeeksforGeeks	https://www.geeksforgeeks.org/computer-fundamentals-tutorial/
2	Operating System Concepts Tutorials by Tutorialspoint	https://www.tutorialspoint.com/operating_system/index.htm
3	IKS Division, Ministry of Education	https://iksindia.org



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Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	P2S01NCINT06	PRACTICALS - I	0-8-0	120	04

- Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:

CLO1: Apply basic programming constructs and aggregate data types to solve practical problems.

CLO2: Utilize composite data types and implement functions for modular programming.

CLO3: Apply advanced Python concepts including exception handling, object-oriented programming, file handling, modules, and basic GUI/database applications.

CLO4: Apply SQL commands (DDL, DML, DCL) to create and manipulate databases and construct complex SQL queries.

CLO5: Develop PL/SQL programs using control structures, database objects, cursors, procedures, functions, triggers and packages.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Practical training and hands-on sessions on Python	Problem-Based Learning, Self-Directed Learning	CLO1, CLO2, CLO3
II	Practical training and hands-on sessions on DBMS	Problem-Based Learning, Self-Directed Learning	CLO4, CLO5

- Assessment Methodologies**

(U) Internal Assessment

(a) Internal Formative assessment (20 Marks)

i. Assignment

ii. Quizzes

(b) Internal Summative Assessment (30 Marks)

i. Mid-term Test

(V) External Examination (50 Marks)

(a) Term-end Examination

(W) Weightage of Learning Efforts for External Assessment

Unit	Aligned COs	Total Learning Hours	Approximate weightage (Marks) to Learning levels (BT)			Total Marks
			Remember (R)	Understanding (U)	Application/Analyse & above (A)	
I	CLO1, CLO2, CLO3	60	5	8	12	25
II	CLO4, CLO5	60	5	8	12	25
		120	10	16	24	50



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• Assessment and Evaluation

Sr. No.	Assessment/Evaluation	Component	Weightage (%)
1	Continuous Internal Evaluation	Assignments, Quizzes, Laboratory Regularity, Internal test	50
2	End-Semester Examination	Practical Examinations	50

(X) CLOs – PLOs Matrix

CLO	PLO									
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	1	3	1	–	–	1	–	–	1
CLO2	3	2	3	2	–	–	1	–	–	1
CLO3	3	3	3	3	2	1	2	1	1	2
CLO4	3	2	3	1	2	–	1	–	–	1
CLO5	3	3	3	3	3	2	2	2	1	2

• Suggested Learning Materials Books:

Sr.No.	Title	Author(s)	Edition/Year	Publisher
1	Core Python Programming	Rao, R. Nageswara	2nd Edition, 2018	Dreamtech Press
2	Learning Python	Lutz, Mark	5th Edition, 2013	O'Reilly
3	Database System Concepts	Silberschatz, A., Korth, H. F., Sudarshan, S.	7th Edition, 2019	McGraw Hill
4	Fundamentals of Database Systems	Elmasri, Ramez; Navathe, Shamkant B.	7th Edition, 2015	Pearson
5	Oracle PL/SQL Programming	Feuerstein, Steven; Pribyl, Bill	6th Edition, 2014	O'Reilly Media
6	SQL: The Complete Reference	Groff, James; Weinberg, Paul; Oppel, Andy	3rd Edition, 2009	McGraw Hill
7	SQL, PL/SQL: The Programming Language of Oracle	Ivan Bayross	4th Edition, 2023	BPB Publications

• Online Resources (Open Source)

Sr.No.	Description of Resource(s)	Weblink
1	Official Python documentation	https://docs.python.org/3/
2	Interactive platform for practicing Python programming and basics	https://www.learnpython.org/
3	Tutorials with live coding examples for Python and SQL	https://www.w3schools.com/
4	Oracle Live SQL for SQL and PL/SQL scripts online	https://livesql.oracle.com/
5	Interactive SQL tutorial	https://sqlzoo.net/
6	Platform for practicing database queries and SQL problem-solving	https://www.hackerrank.com/domains/sql