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

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCINT01**	Object Oriented Programming Using Java	4-0-0	**120**	04

- **Course Learning Outcomes (CLOs)**

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

CLO1: Apply the fundamentals of Java, including its history, features, JDK / JRE and basic program structure.

CLO2: Apply object-oriented programming concepts such as encapsulation, inheritance, polymorphism, and abstraction in Java programs.

CLO3: Develop Java programs using classes, objects, methods, constructors, packages, and interfaces.

CLO4: Implement advanced Java features including exception handling, file I/O, collections, and multithreading.

CLO5: Design and build event-driven graphical Java applications.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	**Introduction to Java and its Basic Concepts** - The Java programming language: history, evolution, features - Introduction to the Java programming environment, JDK, JRE - An anatomy of a Java program - Data types, wrapper classes, automatic boxing and unboxing - Encapsulation, Inheritance, polymorphism, Abstraction - Decision making and Loop Control - Java Programming building blocks: **Class**: Introduction and Definition, Declaration, class body. **Object**: Introduction and Definition, Creating Objects, Declaring, Instantiating and Initialising an Object. - Inheritance analogy in Guru-Shishya parampara - Localization and multilingual systems for Indian languages	CL, PBL, ICT, Collaborative, Reflective	CLO1, CLO2
II	**Introduction to Object-oriented Programming** - Method, Constructor - Static and non-static members - Packages - Inheritance and polymorphism, method overriding - Final and abstract classes, abstract methods - Interfaces - Enumeration - Inner classes and anonymous classes	CL, PBL, Micro-Projects, Collaborative, Research	CLO2, CLO3

III	**More Features of the Java Platform** - Exception handling - Input-output - The collections framework - Introduction to the java.util package - Multithreading	CL, PBL, Micro-Projects, ICT, Research	CLO4
IV	**Graphical Programming** - Introduction to the Graphics Class - Understanding Layout Manager - Abstract Window Toolkit (AWT) Package - Writing graphical programs using Swing library - Using various Swing components - Managing layout using Swing - Event handling using Swing	CL, Experiential, Micro-Projects, PBL, Collaborative, ICT	CLO5

- **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, CLO2	30	5	5	5	15
II	CLO2, CLO3	30	3	6	6	15
III	CLO4	30	2	4	6	12
IV	CLO5	30	1	3	4	08
		120	**11**	**18**	**21**	**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

(D) CLOs – PLOs Matrix

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

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Java: The Complete Reference	Herbert Schildt	11th Edition, 2018.	McGraw-Hill
2	Effective Java	Joshua Bloch	3rd Edition / 2018	Addison-Wesley
3	Java Programming	Joyce Farrell	10th Edition / 2018	Cengage Learning
4	Core Java: Volume I – Fundamentals	Cay S. Horstmann	11th Edition / 2019	Prentice Hall

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	e-PGPathshala	https://inflibnet.ac.in
2	Official Java Documentation by Oracle Corporation	https://docs.oracle.com/javase/tutorial/
3	Free interactive Java course on Codecademy	https://www.codecademy.com/learn/learn-java
4	Java for Beginners to Advanced	https://www.tutorialspoint.com/java/index.htm
5	Introduction to Graphics class and AWT	https://www.javatpoint.com/java-awt
6	Event handling using Swing	https://www.javatpoint.com/event-handling-in-java
7	IKS Division, Ministry of Education	https://iksindia.org

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

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCINT02**	Web Technology	4-0-0	120	04

- **Course Learning Outcomes (CLOs)**

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

CLO1: Apply the fundamentals of web technologies, HTML5, and CSS3 for designing structured web pages.

CLO2: Develop interactive client-side web applications using JavaScript and jQuery.

CLO3: Design and implement server-side scripts for handling client requests and data processing.

CLO4: Apply database connectivity, session management, and authentication techniques in web applications.

CLO5: Evaluate and implement secure, efficient, and error-free web applications using best practices.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	**Fundamentals of Web Technology and Front-end Structure** - Evolution of Web Technology - Core Terminology: Web Pages, Web Servers, Clients, Web Applications, Hosting - HTML5: Document Structure, Semantic Elements, Hyperlinks, Media, Tables, Forms & Advanced Input Types - CSS3: Selectors, Box Model, Positioning Techniques, Flexbox, Grid System - Responsive Web Design and Mobile-First Approach - Digital preservation of cultural heritage	Classroom Learning, ICT-enabled Learning, Inquiry-Based Learning	CLO1
II	**Client-Side Web Development** - JavaScript : Introduction, basic syntax, variables and data types, Statements, Operators, functions and arrays - jQuery : Basics of jQuery and its advantages, syntax, selectors, events handling, effects and animations	Classroom Learning , Micro-Projects, ICT-enabled Learning	CLO2
III	**Server-Side Web Scripting** - Introduction to Server-Side Scripting - Overview of Popular Server-Side Technologies - Working with Forms and Data Handling - User Input Validation	Classroom Learning, Problem-based Learning, Research-Oriented Learning, Collaborative Learning	CLO3

[MSc (Information Technology)] Semester-II

IV	**Advanced Server-Side Web Scripting** - Database connectivity and data operations - Session and cookie management - Database security - User authentication and authorization - Error handling and debugging	Classroom Learning , Micro-Projects, ICT-based Learning, Self-Directed Learning	CLO4, 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**	30	4	5	3	12
II	**CLO2**	30	3	4	5	12
III	**CLO3**	25	2	3	5	10
IV	**CLO4, CLO5**	35	2	3	11	16
		120	11	15	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

(H) CLOs – PLOs Matrix

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

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Web Programming : With HTML5, CSS and JavaScript	John Dean	First Edition / 2019	Jones & Bartlett Learning
2	JavaScript for Modern Web Development	Alok Ranjan, Abhilasha Sinha, Ranjit Battwad	First Edition / 2020	BPB Publications
3	Learning Web Design	Jennifer Niederst Robbins	Fifth Edition / 2018	O'Reilly Media
4	Web Application Security	Andrew Hoffman	First Edition / 2020	O'Reilly Media

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	W3Schools – Tutorials on HTML, CSS, JS	https://www.w3schools.com/
2	Geeksforgeeks	https://www.geeksforgeeks.org/
3	TutorialsPoint: Coding Practice Problems & Tutorials	https://www.tutorialspoint.com/
4	IKS Division, Ministry of Education	https://iksindia.org

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCINT03**	Machine Learning	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 Artificial Intelligence, Machine Learning, and different types of learning approaches.
CLO2: Apply Python libraries such as NumPy, Pandas, Matplotlib, and Scikit-learn for data handling and visualization.
CLO3: Perform data preprocessing tasks including data cleaning, transformation, feature scaling, and feature selection.
CLO4: Implement and evaluate supervised learning algorithms for regression and classification problems.
CLO5: Apply unsupervised learning and ensemble techniques such as clustering, PCA, bagging, and boosting to solve real-world problems.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	**Introduction to Machine Learning and Python Foundations** – Introduction to Artificial Intelligence, Machine Learning, and Deep Learning – Types of Machine Learning – Machine Learning workflow – NumPy (arrays, operations), Pandas (data manipulation) – Matplotlib and Seaborn for data visualization – Learning from examples (Guru-Shishya tradition)	Classroom Lectures, Seminars, and Case-Based Learning (CBL) ICT-Enabled Learning	CLO 1 CLO 2
II	**Data Preprocessing Techniques** – Introduction to data preprocessing and its importance – Data cleaning: Handling missing values (deletion, imputation) – Handling noisy and inconsistent data – Outlier detection and treatment – Data transformation techniques – Encoding categorical variables – Feature scaling: normalization and standardization – Feature selection techniques – Feature extraction basics: – Data splitting: training, validation, and test sets	Classroom Lectures, Seminars, and Problem-Based Learning (PBL) ICT-Enabled Learning	CLO 3
III	**Supervised Learning Algorithms** – Regression: Linear Regression (simple and multiple) – Classification: Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees, Naïve Bayes, Support Vector Machines – Model evaluation: train-test split, cross-validation	Classroom Lectures, Seminars, and Problem-Based Learning (PBL)	CLO 4

	– Performance metrics: Accuracy, Precision, Recall, F1-score, Confusion Matrix – Overfitting and underfitting	Collaborative Learning ICT-Enabled Learning	
IV	**Unsupervised Learning & Advanced Techniques** – K-Means Clustering – Hierarchical Clustering – Dimensionality Reduction: Principal Component Analysis (PCA) – Ensemble Learning: Bagging and Random Forest – Boosting techniques	Classroom Lectures, Seminars, and Problem-Based Learning (PBL) Collaborative Learning ICT-Enabled Learning	CLO 5

- **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**	**30**	1	1	10	12
III	**CLO 4**	**25**	1	1	10	12
IV	**CLO 5**	**25**	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, and Internal Test	50
2	End-Semester Examination	Written Exam	50

(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	Data Science and Machine Learning using Python	Reema Thareja	2nd Edition, 2026	McGraw Hill.
2	Machine Learning for Beginners	Dr. Harsh Bhasin	2nd Edition, 2020	BPB Publications
3	Machine Learning: A Practitioner's Approach	Dr. S. Anand and Dr. Hareendran	2021	PHI Learning

- **Online Resources (Open Source)**

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

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCINT04**	Cyber Security	4-0-0	**120**	04

- **Course Learning Outcomes (CLOs)**

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

CLO1: Evaluate cybercrime classifications, identify types of cybercriminals, and analyze the Indian ITA-2000 & cyber laws in addressing cyber offenses, describe cybercrime tools and methods with the ability to understand their impact on systems.

CLO2: Compare and contrast symmetric and asymmetric key algorithms, digital signatures, message digests, and certificates, Applying cryptographic principles to ensure confidentiality, authentication, integrity, and non-repudiation in digital communication.

CLO3: Apply networking and security concepts to understand cyber-attack mechanisms. Critically assess cyber offenses and propose preventive strategies to safeguard individuals and organizations.

CLO4: Investigate digital evidence using forensic tools, apply the digital forensics life cycle, and address technical challenges in for legal and security purposes.

CLO5: Integrate ethical considerations, legal frameworks, and responsible digital practices into cybersecurity solutions, fostering values of accountability, digital citizenship, and professional integrity.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	Introduction to Cybercrime - Cybercrime: Definition And Origins Of The World - Cybercrime and Information Security - Who Are Cybercriminals? Types of Cybercriminals. - Classifications of Cybercrimes - Cybercrime and the Indian ITA-2000 & Cyber Laws - Cyber Offenses: How Criminals Plan the Attacks - Social Engineering - Cyberstalking - Botnets - Secret communication methods in ancient India	Classroom Lectures, Seminars, ICT-Enabled Learning Discussion, Real-life Examples	CLO1, CLO5
II	Tools and Methods Used in Cybercrime - Password Cracking - Key Loggers and Spywares - Virus and Worms - Trojan Horses and Backdoors - DoS and DDoS Attacks - SQL Injection - Buffer Overflow - Phishing - Identity Theft - Networking Commands	Demonstration, Problem-based Learning, Classroom Lectures, Seminars, ICT-Enabled Learning	CLO1, CLO3

III	Cryptography - Security Services: Confidentiality, Authentication, Integrity, - Non-repudiation, Access Control, Availability - Symmetric Key Algorithms (DES, 3-DES & AES) - Asymmetric Key Algorithms (RSA) - Digital Signature & Message Digest - Digital Certificate	Classroom Lectures, Seminars, ICT-Enabled Learning, Numerical Examples, Diagrammatic Explanation	CLO2
IV	Computer Forensics & Forensics of Hand-Held Devices - The Need for Computer Forensics - Digital Forensics Life Cycle - Forensics and Social Networking Sites: The Security/Privacy Threats - Technical Challenges in Computer Forensics - Hand-Held Devices and Digital Forensics - Forensic Tools	Classroom Lectures, Seminars, ICT-Enabled Learning, Tool-based Learning	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, CLO5	30	2	3	7	12
II	CLO1, CLO3	35	3	5	7	15
III	CLO2	30	2	2	9	13
IV	CLO4, CLO5	25	1	3	6	10
		120	**08**	**13**	**29**	**50**

[MSc (Information Technology)] Semester-II

- **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	2	1	1	–	–	1	–	3	1
CLO2	3	2	1	2	1	1	1	–	2	1
CLO3	3	3	2	2	1	1	1	1	3	1
CLO4	3	3	1	2	2	3	2	1	2	1
CLO5	3	2	1	2	–	2	2	1	3	2

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole, Sunit Belpure	1st Edition / 2011	Wiley
2	Computer Networks	Andrew S. Tanenbaum, David J. Wetherall	5th Edition / 2011	Pearson Education
3	Applied Cryptography: Protocols, Algorithms, and Source Code in C	Bruce Schneier	20th Anniversary Edition / 2015	John Wiley & Sons
4	Cryptography and Network Security	Behrouz A. Forouzan	2nd Edition / 2007	Tata McGraw-Hill (TMH)
5	Network Security Essentials: Applications and Standards	William Stallings	5th Edition / 2014	Pearson
6	Security in Computing	Charles P. Pfleeger, Shari Lawrence Pfleeger	5th Edition / 2015	Prentice Hall
7	Anti-Hacker Tool Kit (Indian Edition)	Mike Shema	2014	McGraw-Hill

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Cyber Laws in India (ITA-2000 Overview)	https://www.indiacode.nic.in/
2	Types of Cyber Attacks – GeeksforGeeks	https://www.geeksforgeeks.org/types-of-cyber-attacks/
3	SQL Injection and Security	https://owasp.org/www-community/attacks/SQL_Injection
4	Cryptography Basics	https://www.geeksforgeeks.org/cryptography-and-its-types/
5	AES, RSA Explained	https://www.tutorialspoint.com/cryptography/
6	Cybersecurity & Forensics Tools	https://www.kali.org/tools/
7	Phishing Awareness	https://www.cisco.com/c/en/us/products/security/email-security/what-is-phishing.html
8	OWASP Security Resources	https://owasp.org/
9	IKS Division, Ministry of Education	https://iksindia.org

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme	Total Notional Hours	Course credits
			L-P-T		
DSC	**P2S02NCINT05**	Software Engineering	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 software engineering, SDLC, and various process models including Agile approaches.

CLO2: Analyze and select appropriate software development models and project planning techniques for given problem scenarios.

CLO3: Develop a structured Software Requirements Specification (SRS) document based on user needs.

CLO4: Design software systems using UML diagrams and apply coding standards to implement solutions.

CLO5: Apply and evaluate different software testing techniques, including black-box and white-box testing, to ensure software quality.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	**Introduction** - Software Engineering – meaning, goal, challenges and approach - Software Development Process Models – waterfall, prototyping, iterative, time boxing and spiral - Introduction to Agile Computing - Agile Software Development Approaches (Scrum, eXtreme - Software Development Life Cycle (SDLC) - Software Requirements Specification (SRS) – Need, structure and components - Software Project Management : Project Planning, various issues addressed in Project Planning, Effort Estimation - Quality assurance through peer learning (Shastrartha debates) - Ethical responsibility in technology (Dharma principles)	**Classroom Lectures,** ICT based Learning**, Problem-Based Learning (PBL)**	CLO1, CLO2, CLO3
II	**Software Design, Coding and Testing** - Object Modeling using UML – Overview, Diagrams –	**Classroom Lectures,** ICT	CLO4, CLO5

	class, sequence, collaboration, use-case, activity, state chart - Coding – meaning, process, programming standards and guidelines, - Testing – meaning, importance, and types - Introduction to Black-box (functional) testing and White-box (structural) testing - Alpha testing and Beta testing	based Learning, **Problem-Based Learning (PBL)**	

- **Assessment Methodologies**

(Q) 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

(R) External Examination (50 Marks)

a. Term-end Examination

(S) 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	30	4	4	4	12
II	CLO4, CLO5	30	4	5	4	13
		60	**8**	**9**	**8**	**25**

- **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

(T) CLOs – PLOs Matrix

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

suggested Learning Materials Books:

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Pankaj Jalote's Software Engineering: A Precise Approach	Jalote Pankaj	Reprint / 2012	Wiley India Pvt. Ltd.
2	Software Engineering, A Practice Approach	Roger S. Pressman	5th Edition / 2012	Mc-Graw Hill International Edition
3	Fundamentals of Software Engineering	Rajib Mall	2nd Edition / 2006	Prentice-Hall of India
4	Head First Agile	Andrew Stellman & Jennifer Greene	1st Edition / 2017	O'Reilly Media Inc.

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Software Engineering Tutorial and Concepts by GeeksforGeeks	https://www.geeksforgeeks.org/software-engineering/
2	Agile and Scrum Resources by Scrum Alliance	https://www.scrumalliance.org/learn-about-scrum
3	UML Diagrams Tutorial by Lucidchart	https://www.lucidchart.com/pages/uml-diagram
4	Software Testing Fundamentals by Guru99	https://www.guru99.com/software-testing.html
5	IKS Division, Ministry of Education	https://iksindia.org

[MSc (Information Technology)] Semester-II

Course Type	Course Code	Course Title	Teaching-Learning Scheme L-P-T	Total Notional Hours	Course credits
DSC	**P2S02NCINT06**	PRACTICALS - II	0-8-0	**120**	04

- **Course Learning Outcomes (CLOs)**

On completion of this course, students will be able to:
CLO1: Develop Java programs using object oriented programming concepts.
CLO2: Implement advanced Java features including exception handling, file I/O, collections, multithreading and develop GUI applications using Java and Swing.
CLO3: Develop interactive client-side web applications using HTML5, CSS3, JavaScript and jQuery.
CLO4: Design and implement server-side scripts for handling client requests and data processing.
CLO5: Apply database connectivity, session management, and authentication techniques in web applications.

Unit	Course Content	Learning Pedagogies*	CLO(s)
I	**Practical training and hands-on sessions on Java**	Problem-Based Learning, Self-Directed Learning	CLO1, CLO2
II	**Practical training and hands-on sessions on Web Technology**	Problem-Based Learning, Self-Directed Learning	CLO3, 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	**60**	**5**	**8**	**12**	**25**
II	CLO3, CLO4, CLO5	**60**	**5**	**8**	**12**	**25**
		120	**10**	**16**	**24**	**50**

- **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	–	–	2
CLO3	3	2	3	2	–	–	1	–	–	2
CLO4	3	2	3	2	–	–	1	–	–	2
CLO5	3	3	3	3	1	1	2	1	2	2

- **Suggested Learning Materials Books:**

Sr. No.	Title	Author(s)	Edition/Year	Publisher
1	Java: The Complete Reference	Herbert Schildt	12th Edition, 2021	McGraw Hill
2	Core Java Volume I - Fundamentals	Cay S. Horstmann	12th Edition, 2021	Pearson
3	Head First Java	Kathy Sierra, Bert Bates, Trisha Gee	3rd Edition, 2022	O'Reilly Media
4	HTML and CSS: Design and Build Websites	Jon Duckett	1st Edition, 2011	Wiley
5	JavaScript and JQuery: Interactive Front-End Web Development	Jon Duckett	1st Edition, 2014	Wiley
6	Learning PHP, MySQL & JavaScript	Robin Nixon	6th Edition, 2021	O'Reilly Media
7	Web Technologies, Black Book	Kogent Learning Solutions	2018	Dreamtech Press

- **Online Resources (Open Source)**

Sr. No.	Description of Resource(s)	Weblink
1	Official Oracle Java Tutorials for comprehensive concepts covering OOP, Collections, and GUI (Swing).	https://docs.oracle.com/javase/tutorial/
2	MDN Web Docs by Mozilla: The standard reference for HTML5, CSS3, and JavaScript.	https://developer.mozilla.org/
3	Beginner-friendly interactive tutorials for Java, HTML, CSS, JavaScript, and Server-side scripts.	https://www.w3schools.com/
4	freeCodeCamp: Project-based learning for Responsive Web Design and JavaScript Data Structures.	https://www.freecodecamp.org/
5	Interactive coding platform for mastering basic and advanced Web development concepts.	https://www.codecademy.com/
6	Detailed tutorials and practical examples for core and advanced Java programming topics.	https://www.geeksforgeeks.org/java/