



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103601

Course / Subject Name: Theory of Computation

w. e. f. Academic Year:	2024-25
Semester:	6 th
Category of the Course:	Professional Core

Prerequisite:	ToC is abstract and logic-heavy, so strong analytical thinking will prepare you to tackle concepts like regular languages, finite automata, grammars, Turing machines, and computational complexity.
Rationale:	The Theory of Computation (TOC) is like the philosophical backbone of computer science—it asks and answers what can be computed, how it can be computed, and what cannot be computed at all.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Identify different formal languages and their relationship.	Understand
2	Classify and construct grammars for different languages and vice-versa.	Apply
3	Build finite automata, push down automata and Turing machine	Apply
4	Analyze various concepts of undecided ability and Computable Function and Discuss analytically and intuitively for problem-solving situation.	Analyze

CO PO Mapping						
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO12
CO1	3	2			1	
CO2	3	3	2			
CO3	3	3	3		2	
CO4	3	3		2		1

CO PSO Mapping			
COs \ PSOs	PSO1	PSO2	PSO3
CO1	✓ High	✓ Medium	✓ High
CO2	✓ High	✓ High	✓ High
CO3	✓ High	✓ High	✓ Medium
CO4	✓ High	✓ Medium	✓ Medium
CO5	✓ Medium	✓ High	✓ High



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Course / Subject Name: Theory of Computation

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				(E)	(M)	(I)	(V)	
4	0	1	5	60	40	20	30	150

Course Content					
Unit No.	Content	No. of Hours	% of Weightage		
1.	Review of Mathematical Theory: Sets, Functions, Logical statements, Proofs, Relations, Languages, Principal of Mathematical Induction, Strong Principle, Recursive Definitions, Structural Induction.	4	10		
2.	Regular Languages and Finite Automata: Regular Expressions, Regular Languages, Application of Finite Automata, Automata with output - Moore machine & Mealy machine, Finite Automata, Memory requirement in a recognizer, Definitions, union- intersection and complement of regular languages, Non Deterministic Finite Automata, Conversion from NFA to FA, - Non Deterministic Finite Automata, Conversion of NFA- to NFA, Kleene's Theorem, Minimization of Finite automata, Regular And Non Regular Languages – pumping lemma.	12	20		
3.	Context free grammar (CFG): Definitions and Examples, Unions Concatenations And Kleene's of Context free language, Regular Grammar for Regular Language, Derivations and Ambiguity , Unambiguous CFG and Algebraic Expressions, BacosNaur Form (BNF), Normal Form – CNF.	8	20		
4.	Pushdown Automata, CFL And NCFL: Definitions, Deterministic PDA, Equivalence of CFG and PDA & Conversion, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL.	8	10		
5.	Turing Machine (TM): TM Definition, Model Of Computation, Turing Machine as Language Acceptor, TM that Compute Partial Function, Church Turning Thesis, Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, Recursively and Enumerable Languages, Context sensitive languages and	8	20		



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	Chomsky hierarchy.		
6.	Computable Functions: Partial - Total - Constant Functions, Primitive Recursive Functions, Bounded Minimization, Regular function, Recursive Functions, Quantification, Minimalization, and μ -Recursive Functions, All Computable Functions Are μ -Recursive	4	10
7.	Undecidability : A Language That Can't Be Accepted, and a Problem That Can't Be Decided , Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Undecidable Problems Involving Context-Free Languages, Post's Correspondence Problem, The Class P and NP.	4	10
	Total	44	100

Revised Bloom's Taxonomy)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	40	-	-	-

Suggested Specification Table with Marks (Theory):

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per

References/Suggested Learning Resources:

(a) Books:

1. Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill
2. An introduction to automata theory and formal languages By Adesh K. Pandey, Publisher: S.K. Kataria & Sons
3. Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc
4. Computation: Finite and Infinite By Marvin L. Minsky Prentice-Hall
5. Compiler Design By Alfred V Aho, Addison Wesley
6. Introduction to the Theory of Computation By Michael Sipser
7. Automata Theory, Languages, and Computation By John Hopcroft, Rajeev Motowani, and Jeffrey Ullman

(b) Open source software and website:

1. **MIT OpenCourseWare – Theory of Computation** Full lecture notes, assignments, and exams from MIT's course. [MIT OCW Course Page](#)
2. **Theory of Computing (ToC) Journal** A peer-reviewed, open-access journal dedicated to theoretical computer science. [theoryofcomputing.org](#)
3. **Open Source Society University (OSSU)** A complete self-taught computer science curriculum, including core theory courses. [OSSU GitHub](#)
4. **Simons Institute for the Theory of Computing** Offers cutting-edge research, workshops, and lecture videos. [Simons Institute](#)
5. Use platforms like GeeksforGeeks and Brilliant.org for interactive



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Suggested Course Practical List:

1. Design a Deterministic Finite Automaton (DFA) that accepts strings containing "111"
2. Construct a DFA that accepts binary strings ending in "101"
3. Implement an algorithm to convert a Non-deterministic Finite Automaton (NFA) to an equivalent DFA
4. Write a program to convert a given regular expression into an NFA
5. Create a Context-Free Grammar (CFG) that generates palindromes over $\{a, b\}$
6. Design a Pushdown Automaton (PDA) that accepts strings with balanced parentheses
7. Simulate a Turing Machine that adds two binary numbers
8. Classify given languages as regular, context-free, or recursively enumerable
9. Use the Pumping Lemma to prove a language is not regular
10. Demonstrate an example of an undecidable problem using Turing Machines

List of Laboratory/Learning Resources Required:

1. **JFLAP**: Visualize and simulate automata, grammars, and Turing machines
2. **Automata Tutor**: Practice designing DFAs, NFAs, and CFGs with feedback
3. **Python/Java**: Great for implementing automata and simulating Turing machines

Suggested Project List:

1. Build a tool (web or desktop) to simulate and visualize DFAs, NFAs, and PDAs with step-by-step transitions
2. Create a program that parses a regular expression and constructs an equivalent NFA
3. Design a tool that checks whether a string belongs to a given context-free grammar
4. Implement a simulator for single-tape or multi-tape Turing Machines with custom input alphabets
5. Build a system that classifies languages as regular, context-free, or recursively enumerable based on user input
6. Develop a tool that helps users apply the Pumping Lemma to prove non-regularity of languages



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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103602

Course / Subject Name: Microprocessor and Interfacing

w. e. f. Academic Year:	2024-25
Semester:	6 th
Category of the Course:	Professional Core

Prerequisite:	<ol style="list-style-type: none"> 1. Digital Logic Design and Basic Electronics. 2. 8085 or 8051 architecture and their instruction sets. 3. assembly language programming. 4. interfacing techniques using simulation tools or development boards like Arduino or 8051 kits.
Rationale:	Microprocessor and Interfacing lies in its foundational role in modern computing and embedded systems.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.	Understand
2	Identify the hardware elements of 8085 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.	Apply
3	Select appropriate 8085 instructions based on size and functions to write a given assembly language program.	Understand
4	Design a given interfacing system using concepts of memory and I/O interfacing.	Apply
5	Demonstrate the features of advance microprocessors.	Apply

CO PO Mapping						
Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6– PO12 (if any)
CO1: Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.	3	2	2	0	1	-
CO2: Identify the hardware elements of 8085 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.	3	2	2	0	1	-
CO3: Select appropriate 8085 instructions based on size and functions to write a given assembly language program.	3	3	3	2	2	-
CO4: Design a given interfacing system using concepts of memory and I/O interfacing.	3	2	3	2	2	-
CO5: Demonstrate the features of advanced microprocessors.	3	1	2	1	2	-

Course Outcome (CO)	Statement	PSO1(Apply fundamentals of electronics, computing, and hardware systems)	PSO2(Design and develop embedded systems or microprocessor-based solutions)	PSO3(Use modern tools to analyze, simulate, and implement embedded applications)
CO1	Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.	✓	✓	
CO2	Identify the hardware elements of 8085 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.	✓		
CO3	Select appropriate 8085 instructions based on size and functions to write a given assembly language program.	✓	✓	
CO4	Design a given interfacing system using concepts of memory and I/O interfacing.		✓	✓
CO5	Demonstrate the features of advance microprocessors.	✓	✓	✓

CO PSO Mapping				
Course Outcome (CO)	Statement	PSO1(Apply fundamentals of electronics, computing, and hardware systems)	PSO2(Design and develop embedded systems or microprocessor-based solutions)	PSO3(Use modern tools to analyze, simulate, and implement embedded applications)
CO1	Demonstrate the various features of microprocessor, memory and I/O devices including concepts of system bus.	✓	✓	
CO2	Identify the hardware elements of 8085 microprocessor including architecture and pin functions and programming model including registers, instruction set and addressing modes.	✓		
CO3	Select appropriate 8085 instructions based on size and functions to write a given assembly language program.	✓	✓	

CO PSO Mapping				
Course Outcome (CO)	Statement	PSO1(Apply fundamentals of electronics, computing, and hardware systems)	PSO2(Design and develop embedded systems or microprocessor-based solutions)	PSO3(Use modern tools to analyze, simulate, and implement embedded applications)
CO4	Design a given interfacing system using concepts of memory and I/O interfacing.		✓	✓
CO5	Demonstrate the features of advance microprocessors.	✓	✓	✓

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				(E)	(M)	(I)	(V)	
3	0	2	4	60	40	20	30	150



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Program Name: Engineering

Level: UG

Course / Subject Code: BE103602

Course / Subject Name: Microprocessor and Interfacing

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Microprocessor, Components of a Microprocessor: Registers, ALU and control & timing, System bus (data, address and control bus), Microprocessor systems with bus organization	4	10
2.	Microprocessor Architecture and Operations, Memory, I/O devices, Memory and I/O operations	4	10
3.	8085 Microprocessor Architecture, Address, Data And Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation Of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing	6	10
4.	Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction and Data Formats, Writing, Assembling & Executing A Program, Debugging The Programs	6	10
5.	Writing 8085 assembly language programs with decision, making and looping using data transfer, arithmetic, logical and branch instructions	6	10
6.	Stack & Subroutines, Developing Counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit Data operations	6	10
7	Interfacing Concepts, Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A	8	20
8	Advanced Microprocessors: 8086 logical block diagram, segmentation, Pin functions, Minimum and maximum mode, 80286/80386: Overview and architecture, Programming model, Data types and instruction set, segments and its types, segment descriptor, descriptor table and selectors.	8	20
Total		48	100

Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
20	40	40	-	-	-

Suggested Specification Table with Marks (Theory):

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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Level: UG

Course / Subject Code: BE103602

Course / Subject Name: Microprocessor and Interfacing

References/Suggested Learning Resources:

(a) Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh S. Gaonkar
Pub: Penram International.
2. 8086 Programming and Advance Processor Architecture, Savaliya M. T., WileyIndia
3. The 8088 and 8086 Microprocessors, Triebel & Singh, Pearson Education
4. Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Oxford
5. Advanced Microprocessors, Daniel Tabak, McGrawHill
6. Microprocessor & Interfacing - Douglas Hall, TMH

(b) Open source software and website:

1. GitHub Microprocessor Topics: Explore hundreds of repositories related to microprocessor design, interfacing, and simulation.
2. OpenRISC Project: A complete open-source ecosystem for RISC-based processors, including simulators, SoC generators, and development tools.
3. GeeksforGeeks Microprocessor Tutorials: Great for learning concepts like 8086 architecture, I/O interfacing, and instruction sets.

Suggested Course Practical List:

1. 8085 assembly language programmes covering all the instructions.
2. Interfacing practicals using I/O instructions



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Course / Subject Code: BE103602

Course / Subject Name: Microprocessor and Interfacing

List of Laboratory/Learning Resources Required:

- **8085 Simulator** : Practice instruction execution and timing diagrams.
- **Proteus Design Suite**: Simulate microprocessor circuits and interfacing hardware.
- **Keil μ Vision**: Ideal for 8051 and ARM-based microcontroller programming.
- **Tinkercad Circuits**: Beginner-friendly platform for simulating basic interfacing projects.

Suggested Project List:

- | | |
|-----------------------------|---|
| 1. Home Automation System | Controls lights/fans via microprocessor and relay interfacing. |
| 2. Smart Energy Meter | Measures and displays energy usage with real-time data logging. |
| 3. Obstacle Avoiding Robot | Uses sensors and microprocessor logic to navigate autonomously. |
| 4. GSM-Based Device Control | Sends commands via SMS to control appliances. |

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103604

Course / Subject Name: Data Mining

w. e. f. Academic Year:	2024-25
Semester:	6 th
Category of the Course:	Professional Elective -2

Prerequisite:	<ul style="list-style-type: none"> • Relational Databases: MySQL, PostgreSQL • NoSQL Databases: MongoDB, Cassandra (for unstructured data) • Data Cleaning & Preprocessing: Handling missing values, normalization, etc.
Rationale:	Data mining lies in its ability to transform raw data into actionable insights that drive smarter decisions, uncover hidden patterns, and create competitive advantages.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Perform the preprocessing of data and apply mining techniques on it.	Apply
2	Identify the association rules, classification, and clusters in large data sets.	Understand
3	Solve real world problems in business and scientific information using data mining.	Apply
4	Use data analysis tools for scientific applications.	Analyse
5	Implement various supervised machine learning algorithms.	Understand

CO PO Mapping												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	-	-	-	-	-	2
CO2	3	3	2	2	2	-	-	-	-	-	-	2
CO3	3	3	3	3	2	2	-	-	-	-	-	-

CO PSO Mapping			
Course Outcomes (COs)	PSO1 (Apply knowledge of computer science to develop solutions for real-world problems)	PSO2 (Use modern tools and techniques for data analysis and system development)	PSO3 (Analyze and interpret data for decision-making in interdisciplinary domains)
CO1: Perform the preprocessing of data and apply mining techniques on it.	2	3	2
CO2: Identify the association rules,	2	3	3

CO PSO Mapping			
Course Outcomes (COs)	PSO1 (Apply knowledge of computer science to develop solutions for real-world problems)	PSO2 (Use modern tools and techniques for data analysis and system development)	PSO3 (Analyze and interpret data for decision-making in interdisciplinary domains)
classification, and clusters in large data sets.			
CO3: Solve real world problems in business and scientific information using data mining.	3	2	3
CO4: Use data analysis tools for scientific applications.	2	3	3
CO5: Implement various supervised machine learning algorithms.	2	3	2

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				(E)	(M)	(I)	(V)	
3	0	2	4	60	40	20	30	150



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103604

Course / Subject Name: Data Mining

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process	3	10
2.	Data Pre-processing: Data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation, feature extraction , feature transformation, feature selection, introduction to Dimensionality Reduction, CUR decomposition	4	20
3.	Concept Description, Mining Frequent Patterns, Associations and Correlations: What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons, Basic concept, efficient and scalable frequent item-set mining methods, mining various kind of association rules, from association mining to correlation analysis, Advanced Association Rule Techniques, Measuring the Quality of Rules.	10	20
4.	Classification and Prediction: Classification vs. prediction, Issues regarding classification and prediction, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms, Neural Network-Based Algorithms, Rule-Based Algorithms, Combining Techniques, accuracy and error measures, evaluation of the accuracy of a classifier or predictor. Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner / WEKA / DTREG DM Tools	10	20
5.	Cluster Analysis: Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data.	10	20



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Program Name: Engineering

Level: UG

Course / Subject Code: BE103604

Course / Subject Name: Data Mining

6.	Web mining and other data mining: Web Mining: Introduction to Web Mining, Web content mining, Web usage mining, Web Structure mining, Web log structure and issues regarding web logs, Spatial Data Mining, Temporal Mining, And Multimedia Mining. Applications of Distributed and parallel Data Mining.	5	10
Total		42	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	40	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2. M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley & Sons Inc.
3. M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
4. Ning Tan, Vipin Kumar, Michael Steinbach Pang, "Introduction to Data Mining", Pearson Education

(b) Open source software and website:

1. Kaggle Datasets
2. Orange Data Mining
3. R and Data Mining
4. Data Stack Hub
5. Datamation's Top Tools

Suggested Course Practical List:



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103604

Course / Subject Name: Data Mining

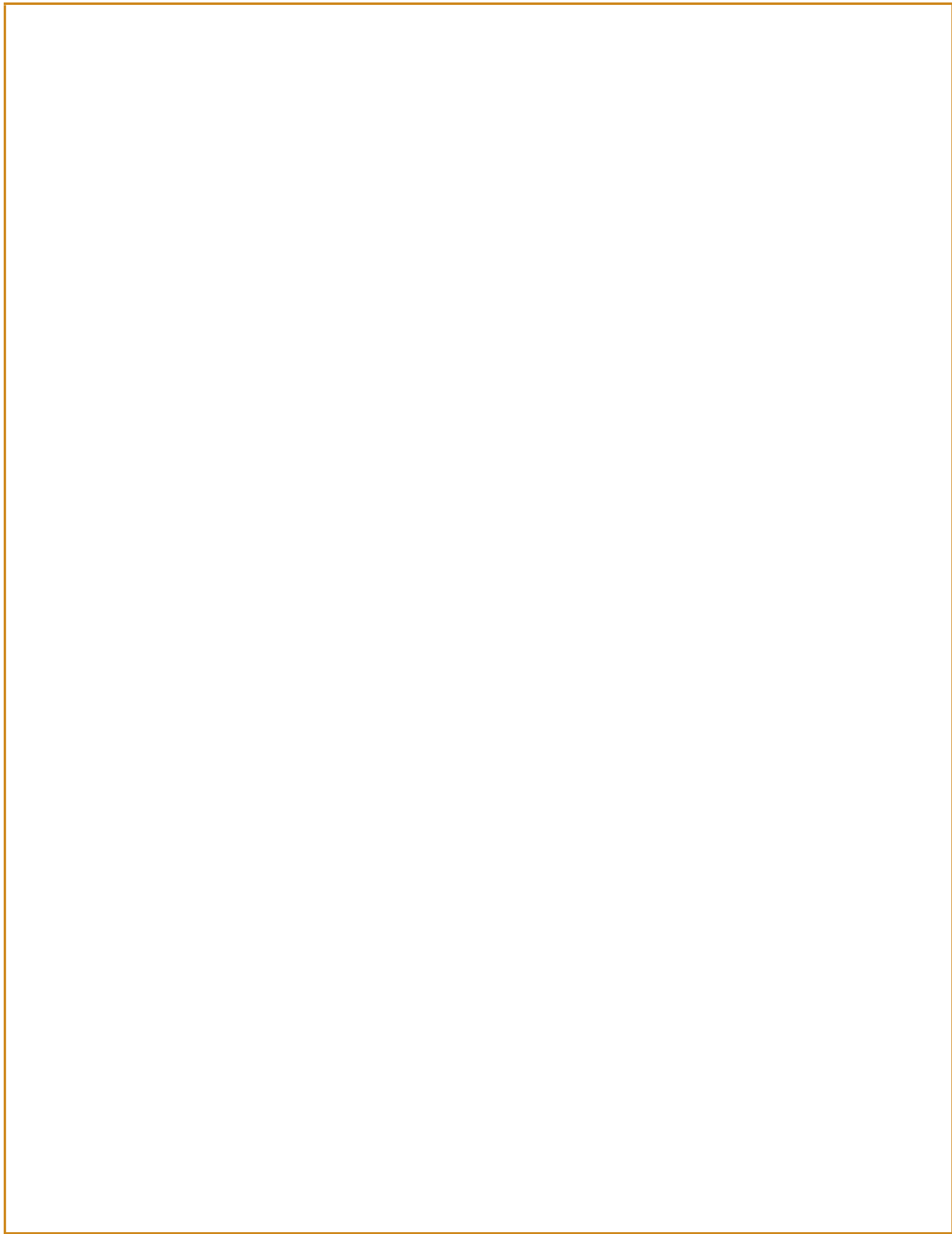
List of Laboratory/Learning Resources Required:

1. Tools like **Tableau**, **Power BI**, or libraries like **Matplotlib**, **Seaborn**
2. Ability to create dashboards and reports for stakeholders
3. **Apache Hadoop**, **Apache Spark**
4. **ETL Pipelines**: Tools like Talend or Apache NiFi
5. **Problem-solving mindset**
6. **Communication skills** to explain findings
7. **Domain expertise** helps contextualize patterns and insights

Suggested Project List:

1. **Credit Card Fraud Detection**: Use anomaly detection and classification on transaction datasets.
2. **Social Media Sentiment Analysis**: Mine tweets to analyze sentiment and trends over time.
3. **Healthcare Predictive Analytics**: Predict the likelihood of diseases (e.g., diabetes) from patient health data.
4. **Clickstream Analysis**: Discover patterns in website user behavior to improve conversion rates.
5. **Graph Mining for Social Network Analysis**: Analyze user influence, connection strength, and community structure.
6. **Real-time Stock Market Pattern Mining**: Explore temporal patterns with time series forecasting and deep learning.
7. **Anomaly Detection in Network Traffic**: Analyze logs to detect potential cyber threats.
8. **Opinion Mining from Product Reviews**: Go beyond sentiment—extract themes and comparative opinions.
9. **Mining Educational Data**: Explore student performance data to predict success factors.

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103605

Course / Subject Name: Advanced Java Programming

w. e. f. Academic Year:	2024-25
Semester:	6 th
Category of the Course:	Professional Elective - 3

Prerequisite:	<ul style="list-style-type: none"> Understand relational databases (like MySQL or PostgreSQL) Be able to write basic to intermediate SQL queries Know how to perform CRUD operations
Rationale:	learning Advanced Java programming lies in its power to unlock the full potential of Java for building robust, scalable, and enterprise-grade applications.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1.	Implement Networking and Data base connectivity in Java for given application.	Apply
2.	Implement webpage with dynamic content and server side web application using Servlet and JSP.	Apply
3.	Use web application framework JSF to build user interfaces.	Apply
4.	Use Object Relation Mapping using Hibernate to build database	Apply

CO PO Mapping						
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6 - PO12
CO1	3	2	2	1	2	-
CO2	3	2	3	2	3	-
CO3	2	1	3	1	3	-
CO4	3	2	3	2	3	-

CO PSO Mapping			
CO \ PSO	PSO1 (Software Design & Dev)	PSO2 (Modern Tech Use)	PSO3 (Communication & Teamwork)
CO1	✓ Medium	✓ High	■ Low
CO2	✓ High	✓ High	■ Low
CO3	✓ Medium	✓ High	■ Low
CO4	✓ Medium	✓ High	■ Low

CO PSO Mapping			
CO \ PSO	PSO1 (Software Design & Dev)	PSO2 (Modern Tech Use)	PSO3 (Communication & Teamwork)
CO5	✓ High	✓ High	✓ Medium

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				(E)	(M)	(I)	(V)	
3	0	2	4	60	40	20	30	150



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103605

Course / Subject Name: Advanced Java Programming

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Java Networking Network Basics and Socket overview, TCP/IP client sockets, URL, TCP/IP server sockets, Datagram, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection	4	10
2.	JDBC Programming The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQLException Class, The SQLWarning Class, The Statement Interface, PreparedStatement, CallableStatement The ResultSet Interface, Updatable Result Sets, JDBC Types, Executing SQL Queries, ResultSetMetaData, Executing SQL Updates, Transaction Management.	6	10
3.	Servlet API and Overview Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor, ServletContext and ServletConfig interface, Attributes in Servlet, Request Dispatcher interface The Filter API: Filter, FilterChain, Filter Config Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting	8	20
4.	Java Server Pages JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing	6	10
5.	Java Server Faces2.0 Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Converter Tag, JSF Validation Tag, JSF Event Handling and Database Access, JSF Libraries: PrimeFaces	6	20
6.	Hibernate 4.0 Overview of Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate O/R Mapping, Hibernate Annotation, Hibernate Query Language	6	20



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Program Name: Engineering

Level: UG

Course / Subject Code: BE103605

Course / Subject Name: Advanced Java Programming

7.	Java Web Frameworks: Spring MVC Overview of Spring, Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect – oriented Spring, Managing Database, Managing Transaction	6	10
Total		42	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	40	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Black Book “ Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath ”
2. Complete Reference J2EE by James Keogh mcgraw publication
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication
4. SCWCD, Matthew Scarpino, Hanumant Deshmukh, Jignesh Malavie, Manning publication
5. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication
6. Java Persistence with Hibernate by Christian Bauer, Gavin King
7. Spring in Action 3rd edition , Craig walls, Manning Publication
8. Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication
9. Java Server Faces in Action, Kito D. Mann, Manning Publication
10. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley
11. Beginning JSP, JSF and Tomcat, Giulio Zambon, Apress
12. JSF2.0 CookBook, Anghel Leonard, PACKT publication
13. Advanced Java, M. T. Savaliya, dreamtech

(b) Open source software and website:

1. Advanced Java Full Course 2023 | Advance Java Tutorial Covers multithreading, JDBC, Spring, REST APIs—great for bridging Core and Advanced Java.
2. Advanced Java Programming A Comprehensive Full Course Starts with collections and data structures, then moves into servlets, applets, and MySQL integration.
3. Learn Java Programming: Lesson 2 - Getting Started A beginner-friendly guide to setting up your Java environment and tools like Eclipse and JDK.

4. Advance Java Syllabus with Projects (JDBC, Servlets & JSP) Gives a clear roadmap of what to expect in Advanced Java and how to prepare with real-world projects.



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103605

Course / Subject Name: Advanced Java Programming

5. Advanced Java for Beginners | Complete Java Programming A full walkthrough from Java basics to advanced concepts like networking and Spring.
6. Advance Java Full Course 2022 | Advance Java Tutorial Includes annotations, reflection, threading, and Spring Boot—ideal for learners transitioning from Core Java.

Suggested Course Practical List:

1. Implement TCP Server for transferring files using Socket and Server Socket.
2. Implement cookies to store first name and last name using Java server pages.
3. Implement the shopping cart for users for the online shopping. Apply the concept of session.
4. Implement student registration form with enrollment number, first name, last name, semester, contact number. Store the details in database. Also implement search, delete and modify facility for student records.
5. Write a Servlet program to print system date and time.
6. Design a web page that takes the Username from user and if it is a valid username prints “Welcome Username”. Use JSF to implement.
7. Write Hibernate application to store customer records and retrieve the customer record including name, contact number, address.
8. Write an application to keep record and retrieve record of student. The record includes student id, enrollment number, semester, SPI. Use MVC architecture.

List of Laboratory/Learning Resources Required:

1. **Java EE (Jakarta EE):** Servlets, JSP, EJB, and Web Services
2. **Multithreading & Concurrency:** Thread lifecycle, synchronization, Executor framework
3. **JDBC:** Database connectivity, transactions, and SQL integration
4. **Frameworks:**
 - **Spring** (Core, Boot, MVC, Security, Data, AOP)
 - **Hibernate** (ORM and database abstraction)
 - **Struts** (for MVC architecture)
5. **Microservices:** REST APIs, Spring Cloud, Docker integration
6. **Testing:** JUnit, Mockito
7. **Security:** Authentication, authorization, Spring Security
8. **Build Tools:** Maven, Gradle
9. **Deployment:** Tomcat, WildFly, Docker



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103605

Course / Subject Name: Advanced Java Programming

Suggested Project List:

1. **AI Chatbot:** Integrate NLP libraries like OpenNLP or Stanford NLP for intelligent conversations.
2. **Real-Time Stock Market Tracker:** Fetch live data via APIs, visualize trends, and send alerts.
3. **Health Monitoring System:** Collect and analyze biometric data from wearables.
4. **Customer Relationship Management (CRM):** Manage leads, sales pipelines, and customer interactions.
5. **Online Examination Portal:** Secure login, timed tests, auto-grading, and analytics.
6. **Multiplayer Game Server:** Use Java Sockets and Threads to manage real-time gameplay.
7. **Smart Traffic Management System:** Simulate traffic flow using sensors and real-time data.

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103606

Course / Subject Name: SYSTEM SOFTWARE

w. e. f. Academic Year:	2023-24
Semester:	6th
Category of the Course:	Elective

Prerequisite:	Data Structures, Operating Systems, Microprocessor & Interfacing
Rationale:	NA

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Explain and classify different methodologies, concepts and approaches to System Software Programming	Understand
2	Identify elements of language processors with various data structures used in development of one-pass and multi-pass assemblers.	Apply
3	Examine macro processor, its usage and compare various loading and linking schemes.	Apply
4	Build various system programs using language processor development tools such as YACC and Lex.	Apply
5	Design code optimization based solution for the given system problems by applying various techniques of compiler, interpreter and debugger.	Understand

CO PO Mapping												
Course Outcome (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1: Explain and classify different methodologies, concepts and approaches to System Software Programming	✓											✓
CO2: Identify elements of language processors with various data structures used in development of one-pass and multi-pass assemblers	✓	✓										✓
CO3: Examine macro processor, its usage and compare various loading and linking schemes	✓	✓	✓									✓
CO4: Build various system programs using language processor development tools such as YACC and Lex	✓	✓	✓		✓							✓



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103606

Course / Subject Name: **SYSTEM SOFTWARE**

CO PO Mapping												
Course Outcome (CO)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO5: Design code optimization-based solutions for system problems using compiler, interpreter, and debugger techniques	✓	✓	✓	✓	✓							✓

CO PSO Mapping				
Course Outcomes (COs)	CO Description	PSO1(Apply knowledge of programming and computer fundamentals)	PSO2(Design and develop software solutions)	PSO3(Use modern tools to solve real-world problems)
CO1	Explain and classify different methodologies, concepts, and approaches to system software programming.	3	2	1
CO2	Identify elements of language processors with various data structures used in development of one-pass and multi-pass assemblers.	3	2	2
CO3	Examine macro processor, its usage, and compare various loading and linking schemes.	2	3	2
CO4	Build various system programs using language processor development tools			

Teaching and Examination Scheme:

Hours per Week			Course Credits	Examination Marks				150
L	T	P		Theory Marks		Practical Marks		
				E	M	I	V	
3	0	2	4	60	40	20	30	



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103606

Course / Subject Name: **SYSTEM SOFTWARE**

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Overview of System Software Introduction, Software, Software Hierarchy, Systems Programming, Machine Structure, Interfaces, Address Space, Computer Languages, Tools, Life Cycle of a Source Program, Different Views on the Meaning of a Program, System Software Development, Recent Trends in Software Development, Levels of System Software	04	10
2.	Overview of Language Processors Programming Languages and Language Processors, Language Processing Activities, Program Execution, Fundamental of Language Processing, Symbol Tables Data Structures for Language Processing: Search Data structures, Allocation Data Structures.	04	10
3.	Assemblers Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86 , Algorithm of Single Pass Assembler, Multi-Pass Assemblers, Advanced Assembly Process, Variants of Assemblers Design of two pass assembler,	05	15
4.	Macro and Macro Processors Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design Of a Macro Preprocessor, Design of a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass Macro Processors, One-Pass Macro Processors	07	20
5.	Linkers and Loaders Introduction, Relocation of Linking Concept, Design of a Linker, SelfRelocating Programs, Linking in MSDOS, Linking of Overlay Structured Programs, Dynamic Linking, Loaders, Different Loading Schemes, Sequential and Direct Loaders, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, Practical Relocating Loaders, Linking Loaders, Relocating Linking Loaders, Linkers v/s Loaders	04	10
6.	Scanning and Parsing Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing, Language Processor Development Tools, LEX, YACC	04	10
7.	Compilers Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization	3	8
8.	Interpreters & Debuggers Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Classification of Debuggers, Dynamic/Interactive	3	7
	Total	48	100



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103606

Course / Subject Name: **SYSTEM SOFTWARE**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
07	30	33	7	7	7

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

- 1) System Programming by D M Dhamdhare, McGraw Hill Publication
- 2) System Programming by Srimanta Pal, OXFORD Publication
- 3) System Programming and Compiler Construction by R.K. Maurya & A. Godbole.
- 4) System Software – An Introduction to Systems Programming by Leland L. Beck, 3rd Edition, Pearson Education Asia, 2000
- 5) System Software by Santanu Chattopadhyay, Prentice-Hall India, 2007

(b) Open source software and website:

www.cs.jhu.edu/~scott/pl/lectures/parsing.html

www.en.wikipedia.org/wiki/System_programming

<https://www.isi.edu/~pedro/Teaching/CSCI565-Fall15/Materials/LexAndYaccTutorial.pdf>

<https://developer.ibm.com/technologies/systems/tutorials/au-lexyacc/>

Suggested Course Practical List:

- Practical 1: Case Study and Classification
- Practical 2: Comparative Analysis.
- Practical 3: Simulate One-Pass Assembler
- Practical 4: Two-Pass Assembler Simulation
- Practical 5: Macro Processor Implementation
- Practical 6: Static vs Dynamic Linking
- Practical 7: Lex Program for Token Identification
- Practical 8: YACC Program for Expression Parsing
- Practical 9: Code Optimization Techniques
- Practical 10: Debugging Simulation



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103606

Course / Subject Name: SYSTEM SOFTWARE

List of Laboratory/Learning Resources Required:

1. System Software Programming Methodologies & Approaches
2. Design and Implementation of a One-Pass and Multi-Pass Assembler
3. Develop a Macro Processor for Assembly Language and Compare Loading Techniques
4. Build a Simple Compiler Front-End Using Lex and YACC
5. Design and Implement Code Optimization Techniques for Intermediate Code



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103607

Course / Subject Name: IOT and Applications

w. e. f. Academic Year:	2023-24
Semester:	6th
Category of the Course:	Open elective - 2

Prerequisite:	C Programming, Microprocessor, Networking
Rationale:	Internet of Things plays an important role in connecting the things i.e. variety of devices through the Internet. The IoT has emerged as an cutting-edge technology with applications in manufacturing, healthcare, Agriculture, transport, mining, smart cities and many more. This subject covers the fundamentals of IoT with its architecture, protocols and Applications. It also covers the overview and programming of two widely used IoT platforms Arduino and Raspberry Pi

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Demonstrate the architecture and functioning of IoT systems including the sensors and microcontrollers with their interfacing and software need considering application areas. •. •.	Understand
2	Diagnose the various IoT protocols with detailing of their elements and overall functioning within IoT systems for efficient communication	Apply
3	Design an IoT system to take the benefit of the Clouds for computing and storage considering security issues	Apply
4	Leverage the benefits of IoT technologies for automating the various real-life challenges in various application areas.	Apply
5	Develop the software components of IoT system using Arduino/Raspberry Pi Programming.	Understand

CO PO MAPPING												
Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1: Demonstrate the architecture and functioning of IoT systems including the sensors and microcontrollers with their interfacing and software needs.	✓		✓	✓	✓							



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103607

Course / Subject Name: IOT and Applications

CO PO MAPPING												
Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO2: Diagnose the various IoT protocols with detailing of their elements and overall functioning within IoT systems for efficient communication.	✓	✓	✓		✓							
CO3: Design an IoT system to take the benefit of the Clouds for computing and storage considering security issues.		✓	✓	✓	✓		✓					
CO4: Leverage the benefits of IoT technologies for automating the various real-life challenges in various application areas.	✓	✓	✓	✓	✓	✓	✓		✓			
CO5: Develop the software components of IoT system using Arduino/Raspberry Pi Programming.	✓		✓		✓							✓

CO PSO Mapping												
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	1	1	1	1	1	1	2
CO2	3	3	2	2	3	1	1	1	1	1	1	2
CO3	3	3	3	2	3	2	1	2	1	1	2	2
CO4	2	3	3	2	2	2	2	1	2	2	2	3
CO5	3	2	3	2	3	1	1	1	2	2	2	3

Teaching and Examination Scheme:

Hours per Week			Course Credits	Examination Marks				150
L	T	P		Theory Marks		Practical Marks		
				E	M	I	V	
2	0	2	3	60	40	20	30	



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103607

Course / Subject Name: IOT and Applications

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Internet of Things: 04 Application areas of IoT, Characteristics of IoT, Things in IoT, IoT stack, Enabling technologies, IoT challenges, IoT levels, IoT and cyber physical system, IoT and WSN	4	13
2.	Sensors, Microcontrollers, and Their Interfacing: Sensor interfacing, Types of sensors, Controlling sensors, Microcontrollers, ARM	4	13
3.	Protocols for IoT : 04 06 Messaging protocols, Transport protocols, IPv4, IPv6, URI	6	20
4.	Cloud for IoT: IoT and cloud, Fog computing, Security in cloud, Case study	4	13
5.	Application Building with IoT: 04 04 Various application of IoT : Food, Healthcare, Lavatory maintenance, Water quality, Warehouse, Retail, Driver Assistance, Collision impact	4	13
6.	Arduino and Raspberry Pi: Arduino : Architecture, Programming and Application Raspberry Pi : Architecture, Programming and Application	6	20
7	IoT Security: 06 02 Various security issues and need, architecture, requirement, challenges and algorithms	2	6
Total		30	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	40	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Internet of Things, Vasudevan, Nagrajan and Sundaram, Wiley India
 IoT Fundamentals, David Henc at el, Cisco Press
 21 IoT Experiments, Yashavant Kanetkar, Shrirang Korde, BPB
 IoT Based Projects, Rajesh Singh at el, BPB
 Internet of Things with ARDUINO and BOLT, Ashwin Pajankar, BPB
 Star Expert IoT Specialist, STAR CERTIFICATION



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE103607

Course / Subject Name: IOT and Applications

Suggested Course Practical List:

Practical should be performed by students based on - Using Arduino or Raspberry Pi boards and its software platforms

List of Laboratory/Learning Resources Required:

Introduction to IoT Architecture
Sensor and Microcontroller Interfacing
IoT Communication Protocols - MQTT
IoT Communication Protocols - HTTP and CoAP
Cloud Integration with IoT
Security in IoT Systems
Home Automation using IoT
Smart Agriculture System
Real-time Data Logging and Visualization

Suggested Project List:

Smart Home Automation System
IoT Protocol Analyzer Tool
Smart Agriculture System with Cloud Integration
Industrial Equipment Health Monitoring
Smart Health Monitoring Wearable

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development

w. e. f. Academic Year:	2024-25
Semester:	5th
Category of the Course:	Professional Elective - 1

Prerequisite:	Conceptual Understanding Core Technologies to Learn First Tools & Platforms
Rationale:	web development is the backbone of the modern internet—powering everything from personal blogs to billion-dollar platforms.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Understand the concepts of WWW, HTTP protocol and client-server architecture.	Understand
2	Learn and apply various HTML tags to build the user friendly web pages.	Apply
3	Explore the new features of CSS to define and apply CSS rules in the web pages for rich User Interface.	Apply
4	Create interactive web pages to improve the user experience using client side scripting with Javascript.	Create
5	Design and develop fully functional dynamic web applications using the concepts of PHP, MySQL.	Apply
6	Learn and apply advanced asynchronous web communication mechanisms like REST API, AJAX and JQuery for building highly interactive webpages.	Apply

CO PO Mapping												
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2	3	2			2							
CO3	3	2			2							



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development

CO PSO Mapping												
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2								
CO2	3	2			2							
CO3	3	2			2							
CO4	3	2	2		3					2		
CO5	3	2	3		3					2	2	
CO6	3	3	3		3					2	2	2

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				(E)	(M)	(I)	(V)	
3	0	2	4	60	40	20	30	150

Course Contents

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction: Basics of WWW, HTTP protocol methods and headers, HTTP Request and Response, Architecture of web browser, Web server installation and configuration, Web security, CORS, Understanding SEO	3	10
2.	HTML & CSS: HTML page structure, formatting tags in HTML, tables, links, images, meta tags, frames, html form tags, media, APIs, HTML5 tags in relation to validations and SEO. CSS: Need for CSS, Basic syntax and structure, Backgrounds, Colors and properties, Manipulating texts, Fonts, borders and boxes, Margins, Padding Lists, CSS2, CSS3, Animations, Tool-Tips, Style images, Variables, Flex Box, Media Queries, Wildcard Selectors (*, ^ and \$) in CSS, Working with Gradients, Pseudo Class, Pseudo elements, basic of frameworks like Bootstrap, Responsive web design and Media Query, CSS variables	8	20



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development

3.	Java Script: Javascript Syntax, Types of Javascript, variables, arrays, functions, conditions, loops, Pop up boxes, Javascript objects and DOM, Javascript inbuilt functions, Javascript validations, Regular expressions, Event handling with Javascript, Callbacks in Javascript, Function as arguments in Javascript, Object concepts in Javascript, JSON	10	20
4.	PHP Basics Introduction to Server side programming , PHP variables , decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, String, Form processing, File uploads, Dates and timezone, Working with Regular Expressions, Exception Handling, Working with JSON data, Object Oriented Programming with PHP	7	10
	Session and State Management using PHP		
5.	Advanced Concepts Session management, Various techniques for state and session management like Hidden Fields, Query String, Creating and Destroying Session using PHP	3	10
7.	jQuery: Working with jQuery, Using plugins in jQuery and Creating Image slider, Generating charts from data using 3rd Party Libs	6	10
6.	Database Connectivity using PHP: Basic commands for database connection and query execution with CURD examples, Object oriented database access using PHP.	5	20
	Total	42	100



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development

List of Laboratory/Learning Resources Required:

1. Visual Studio Code
2. Brackets
3. Git
4. XAMPP / Wamp Server
5. Bootstrap, Tailwind CSS, React, Vue.js
6. WordPress.org, Joomla, Drupal

Suggested Project List:

1. **E-commerce Website** – Product listings, cart, and checkout (mock or real).
2. **Chat App** – Real-time messaging using WebSockets or Firebase.
3. **Expense Tracker** – Track income and expenses with charts.
4. **Blog Platform** – Add authentication and CRUD functionality.
5. **Movie Search App** – Use the TMDB API to search and display movies.
6. **Markdown Editor** – Live preview of markdown syntax.
7. **Authentication System** – Login/signup with session or JWT.
8. **Social Media Dashboard** – Post, like, comment, and follow users.
9. **Online Learning Platform** – Courses, quizzes, and progress tracking.
10. **Real-Time Collaboration Tool** – Like Google Docs with socket.io..
11. **Job Board** – Post and apply for jobs with admin panel.
12. **AI Image Generator** – Use an API like OpenAI or replicate a model.
13. **SaaS Billing System** – Subscription-based app with Stripe integration.
14. **CMS (Content Management System)** – Custom-built with admin controls.

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE104502

Course / Subject Name: Web Development