

Program Structure & Syllabus
B.Tech (CSIT) – III YEAR
Symbiosis University of Applied Sciences

School of Computer Science and Information Technology													
B. Tech. (Computer Science and Information Technology)													
Semester-V													
S. N.	Subject Code	Subject Name		Hours					Credits				
			C	L	T	P	S	H	L	T	P	S	C
1	BTCS0501	Cryptography and Cyber Security	4	1	0	4	1	6	1	0	2	1	4
2	BTCS0502	Theory of Computation and Compilers	4	1	1	2	1	5	1	1	1	1	4
3	BTCS0503	Financial Accounting	4	1	1	2	1	5	1	1	1	1	4
	BTCS0504	Supply Chain Management											
	BTCS0505	Machine Learning											
4	BTCS0506	Artificial Intelligence	5	2	0	2	2	6	2	0	1	2	5
5	BTCS0507 BTCS0508	Frameworks (Node JS, Angular JS) Python	2	0	0	2	1	3	0	0	1	1	2
6	BTCS0509	Innovative Project	3	0	0	4	1	5	0	0	2	1	3
7	IDSC0305	Interdisciplinary Course – V	3	0	0	0	3	3	0	0	0	3	3
		Total Credits	25	5	2	16	10	33	5	2	8	10	25
8	BTCS0510	Internship-II	8	-	-	-	-	-	-	-	-	8	8
		Total Credits:	33	-	-	-	-	-	-	-	-	-	33
# Students are expected to work for 30 hours /week to acquire relevant skills													

Cryptography and Cyber Security

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction	Introduction: Introduction to Cryptography, Security Goals, Attacks, Vulnerability. Security services, mechanism and Techniques. Model for Network Security.
2	Symmetric Key Cryptography	Symmetric Key Cryptography: Classical Cryptographic Techniques. Block Cipher Principles, Block Cipher Design Principles and Block Cipher Operation. Simplified Data Encryption Standard (DES), Double and Triple Data Encryption Standard (DES). Advanced Encryption Standard (AES).
3	Asymmetric Key Cryptography	Asymmetric Key Cryptography: Principles of Public Key Cryptography, RSA Algorithm. Diffie-Hellman Key Exchange, ElGamal Cryptosystem and Elliptic Curve Cryptography.
4	Cryptographic Data Integrity Algorithms & Key Management	Cryptographic Data Integrity Algorithms & Key Management: Hash Functions, Application, Requirement and Security of Hash Functions. Secure Hash Algorithm (SHA). Message Digest Algorithm (MD5). Message Authentication Requirement and Message Authentication Functions. Message Authentication Code (MAC) and Security of Message Authentication (MACs). Digital Signatures. Key Distribution Techniques, Kerberos.
5	Network & Cyber Security	Network and Cyber Security: IP Security, Web Security, Firewalls, Trusted Systems and Intrusion Detection & Prevention, Cyber Forensics. Trojans, Viruses and Worms, Denial of Service Attacks and Phishing. Hacking, Classes of Hacker, Foot printing, Scanning, E-Mail Spiders. Cyber Law.

Reference Books:

- Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education.

Theory of Computation and Compilers

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Unit 1: Finite Automata	Sets, Functions, relations, languages, Finite Automata: Basic machine, FSM, DFA, NDFA, Equivalence of DFA and NDFA, FSM with output, Minimization of DFA , Two-way finite automata.
2	Unit 2: Regular Grammar & Regular language	Regular set & their closure properties, Regular expressions, regular languages, Chomsky classification of languages, Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, CNF & GNF.
3	Unit 3: Push down automata & Turing Machine	Pushdown Automata, Definition, deterministic PDA, Equivalence of CFG and PDA. Turing Machine Definition, Model Of Computation And Church Turning Thesis, computing functions with TM, Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, Recursively and Enumerable Languages.
4	Unit 4: Compiler Design- Lexical Analysis & Syntax Analysis	Phases of Compiler Design, Lexical Analysis, tokens & specifications, Syntax Analysis, Parsing & error Recovery. Top Down Parsing -General Strategies- Recursive Descent Parser, Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0) Item- Construction of SLR Parsing Table -Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer
5	Unit 5: Semantic Analysis & Code generation	Semantics, Semantics Errors, types of attributes, Symbol table, Intermediate code generation & code optimization and its strategies. Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms- Issues in Design of a Code Generator – A Simple Code Generator Algorithm.

Reference books:

- Introduction to Automata theory, Languages & computation by John E. Hopcroft, Jeffery Ullman
- Theory of Computer Science by K.L.P Mishra & N.Chandrasekaran

Financial Accounting

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction to Accounting	Meaning and Definition of Accounting, Parties or Users interested in Accounting, Branches of Accounting, Meaning and Definition of Management Accounting, Distinction between Management Accounting and Financial Accounting. Accounting Concepts and Conventions
2	Basic Accounting Terms	Asset, Liability, Capital, Expense, Income, Expenditure, Revenue, Debtors, Creditors, Goods, Cost, Gain, Stock, Purchase, Sales, Loss, Profit, Voucher, Discount, Transaction, Drawings, Introduction to Book Keeping and Accountancy
3	Journalizing	Classification of accounts, personal, real and nominal; golden rules of accounting for each type; Journal: Meaning, Definition, formats, simple Journal entry Problems. Personal Accounts in Banking Sectors. GST related journal entries.
4	Ledger Posting	Meaning, Definition, formats, Posting from Journal to ledger. Online ledgers to be maintained in GST Electronic cash, credit and liability ledger.
5	Final Accounts.	Introduction , Meaning , Objectives of preparing a trial balance , Methods of preparing a trial balance, Preparation of Trial balance, Introduction to final accounts, Meaning, Objectives and Characteristics of Final Accounts, preparation of profit and loss statements and balance sheet.

Reference Books:

- Financial Accounting: S N Maheshwari & Sharad K Maheshwari
- Financial Accounting: Rajasekaran V.

Supply Chain Management

Sr. No	Unit	Detailed Topic wise Syllabus
1	Introduction to Supply Chain Management (SCM)	Introduction, Core Concept of SCM, Nature and Scope of SCM, Decision Phases in SCM, Process of SCM, Three Tier Concept of SCM, Pitfalls in Inventory Management under SCM, SCM Elements, Competitive Strategy versus SCM Strategy, Achieving Strategic Fit, Factors affecting Strategic Fit, The Role played by Major Drivers in achieving Strategic Fit, The Obstacles in Strategic Fit Achievement, Importance of SCM in Business Management
2	Inventory Management	Introduction, Advantages and Disadvantages of Inventory, Constituents of Inventory Costs, Economic Order Quantity (EOQ), Selective Control of Inventory, Inventory Turnover Ratio
3	Transportation	Introduction, Functions of Transport Department, Constituents of Transportation Cost, Modes of Transport, Transport Documents
4	Packaging	Introduction, Functions of Packaging, Problems of Packaging, Types of Packaging, Packaging Machines and Materials, Labelling and Symbols in Packaging
5	Warehousing	Introduction, Types of Warehouses, Functions of Warehousing, Cost of Warehousing, Warehouse Locations, Warehouse Layout, Identification of Material in a Warehouse
6	Modern Concepts in Logistics	Introduction to Cross Docking, Introduction to Barcoding, Introduction to RFID (Radio Frequency Identification), Introduction to Smart Cards, Introduction to ECR (Efficient Consumer Response), Introduction to VMI (Vendor Managed Inventory)
7	Role of IT in Supply Chain Management	Introduction, Role played by IT in SCM, Benefits of IT in a Supply Chain, IT Enabled Supply Chain, Radio Frequency Identification in SCM

Reference Book:

- Handfield, R.B., Nichols, E.L., 1999, Introduction to Supply Chain Management, Prentice-Hall, Englewood Cliffs, NJ.
- Forrester, J. W. 1961. Industrial Dynamics. Wiley.

Machine Learning

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Unit 1: Introduction to Machine Learning	Introduction What is Machine Learning Types and Applications of ML AI vs ML Essential Math for ML and AI
2	Unit 2: Supervised Learning	Introduction to Supervised Learning Linear Methods for Classification Linear Methods for Regression Support Vector Machines Basis Expansions Model Selection Procedures Bonus! Supervised Learning Project in Python Part 1 Bonus! Supervised Learning Project in Python Part 2
3	Unit 3: Unsupervised Learning	Introduction to Unsupervised Learning Association Rules Cluster Analysis Reinforcement Learning Bonus! KMeans Clustering Project
4	Unit 4: Neural Networks	Introduction to Neural Networks The Perceptron The Backpropagation Algorithm Training Procedures Convolutional Neural Network
5	Unit 5: Real World Machine Learning	Introduction to Real World ML Choosing an Algorithm Design and Analysis of ML Experiments Common Software for ML Minor Project

Reference Book:

- Shai Shalev-Shwartz and Shai Ben-David. Published 2014 by Cambridge University.
- AK Gupta and Mishra

Artificial Intelligence

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction to Artificial Intelligence	Definition, AI problems, AI techniques, different. Tasks associated with Artificial Intelligence, examples of AI system
2	Problems , problem spaces and search	Problem as a state space search. Requirement of a formal description of a problem, production system, control strategy & its requirement. Breadth first search & Depth first search, Heuristic technique, problems of heuristic technique with real world. Search methods such as generate and test, hill climbing, simulated annealing, best first search, OR graphs, A* algorithm, AO*.
3	Knowledge representation logic and rules	Prepositional Logic: Syntax, Semantics, Knowledge base and inference. Predicate logic: Representation of fact in predicate logic, Unification algorithm, Resolution in predicate and prepositional logic. Procedural versus declarative knowledge, forward versus backward reasoning, Weak & Strong Slot & filler structure: usefulness of slot & filler structure, semantic net, intersection search, semantic net, partitioned semantic net, frames. Conceptual Dependency, Script, Ontology
4	Machine learning and expert systems	Supervised, Unsupervised, Rote and Reinforced Learning. Machine Learning Expert System : Definition, model, characteristic, architecture, development process, limitations, knowledge Representation Schemes, Blackboard Learning Model. Case Study: Mycin
5	Soft computing and its applications	Neural Network: Basic Concept, Model of Artificial Neuron. Neural Network Architectures: Perceptron, Adaline, Madaline, and Backpropagation Learning Algorithm. Applications of Neural Network

Reference Book:

- Introduction to Artificial Intelligence , Stuart Russel and Peter Norvig
- Artificial Intelligence and Elaine Rich, Kevin Knight, and Shivashankar B. Nair

Frameworks (Node JS, Angular JS)

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Unit 1	AngularJS Tutorial ,What is AngularJS ,AngularJS MVC AngularJS First App, AngularJS Data Binding, AngularJS Expressions, AngularJS Directives
2	Unit 2	AngularJS Controllers ,AngularJS Modules AngularJS Scopes, AngularJS Dependency ,AngularJS Filters, AngularJS Tables, AngularJS Select
3	Unit 3	AngularJS DOM, AngularJS Forms, AngularJS Validation, AngularJS AJAX ,AngularJS Animation
4	Unit 4	AngularJS Forms, AngularJS Validation,
5	Unit 5	AngularJS AJAX ,AngularJS Animation

Reference Book:

AngularJS Brad Green and Shyam Seshadri

Learning AngularJS Brad Dayley

Python

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction to Python	What is Python and history of Python Unique features of Python First Python Program Python Identifiers, Keywords and Indentation Python Data Types
2	List, Ranges , arrays & Tuples in Python	Lists in Python Understanding Iterators Understanding and using Ranges Lambda Expressions Tuples Arrays Numpy
3	I/O , Dictionaries, sets in python	Python Dictionaries Python Sets Examples Getting User Input Reading and writing text files Writing Binary Files Manually Using Pickle to Write Binary Files
4	Python built in function	Python user defined functions Python packages functions Loops and statement in Python Python Modules & Package Defining and calling Function The anonymous Functions
5	Python Object Oriented	Overview of OOP Creating Classes and Objects Exception handling The match Function The search Function Multithreading

Reference book:

- Introduction to Python Learning Python Book by David Ascher and Mark Lutz
- List, Ranges , arrays & Tuples in Python Programming in Python 3: A Complete Introduction to the Python Language Book by Mark Summerfield

School of Computer Science and Information Technology													
B. Tech. (Computer Science and Information Technology)													
Semester-VI													
S. N.	Subject Code	Subject Name		Hours					Credits				
			C	L	T	P	S	H	L	T	P	S	C
1	BTCS0601	Soft Computing	4	1	1	2	1	5	1	0	2	1	4
2	BTCS0602	Internet of Things	4	2	0	2	1	5	1	1	1	1	4
3	BTCS0603 BTCS0604	IT in Banking, Financial Services and Insurance	4	1	1	2	1	5	1	1	1	1	4
4	BTCS0605	Data Analytics using R Agile Technology	4	2	0	2	1	5	2	0	1	2	4
5	BTCS0606	Cloud Infrastructure and Services	4	2	0	2	1	5	0	0	1	1	4
6	BTCS0607 BTCS0608 BTCS0609	LAMP User Interface Design SCALA	2	0	0	2	1	3	0	0	2	1	2
7	IDSC0306	Interdisciplinary Course – VI	3	0	0	0	3	3	0	0	0	3	3
		Total Credits:	25	8	2	12	9	31	5	2	8	18	25

Soft Computing

Sr. No	Module/Units	Detailed Topic wise Syllabus
1.	Soft Computing :	Soft Computing : Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms
2.	Neural Network :	Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.
3.	Counter propagation network:	Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.
4.	Fuzzy Logic:	Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, v Fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.
5.	Genetic algorithm :	Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods

Reference books:

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.

Internet of Things

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Overview of Internet of Things (IoT) and its Architecture:	Introduction, Conceptual Framework, Architectural View, Sources of IoT, M2M Communication, Examples of IoT.
2	Design Principles for Connected Devices	IoT/M2M Systems Layers, Communications Technologies, Data Enrichment, Data Consolidation and Device management.
3	Sensor Networks and Communication Technologies	Sensor Technology, Actuators, Sensor Data Communication Protocols, Radio Frequency Identification Technology, Communication Network requirements, Wireless Sensor Networks Technology, Introduction to ZigBee, WiFi, LTE, IEEE 802.11ah, Data Rate, Range, Power, Bandwidth.
4	Data Acquiring, Organising, Processing and Analytics:	Introduction, Data Acquiring and storage, Organising the Data, Transactions, Business Processes, Integration and Enterprise Systems, Analytics, Knowledge Acquiring, Managing and store processes.
5	Prototyping the Embedded devices for IoT and M2M:	Introduction to Embedded Electronics, Embedded Computing, Embedded platform for prototyping, Things always connected to the Internet.

Reference Books:

- IoT Inc: How Your Company Can Use the Internet of Things to **Book by Bruce Sinclair**
- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things Book by David Hanes, Gonzalo Salgueiro, and Patrick Grossetet

IT in Banking, Financial Services and Insurance.

Sr. No	Module/Units	Detailed Topic wise Syllabus (In bullet points)
1	Essentials of Banking Computerization	<ul style="list-style-type: none"> • Bank Computerisation • LAN and WAN • UPS • Core Banking System • Business Components. • Use of AI in BFSI.
2	Payment System and Electronic Banking	<ul style="list-style-type: none"> • Electronic Payment System(ATM, NPCI) • Personal Identification Number • Electromagnetic Cards(Credit Card, Electronic Cheque, Electronic Cash, Electronic Token, Corporate Cash Management Services) • Electronic Banking(Anywhere, Anytime, Mobile, ecommerce) • Cheque Truncation System • Note Counting Machines.
3	Data Communications Network and EFT Systems.	<ul style="list-style-type: none"> • Advent of Information Technology in BFSI • Data Communication Network • Major Networks in India • Emerging Trends in Communication in Network for BFSI • Structure Message Transfer System using SWIFT • Automated Clearing Systems • Point of Sale(POS) Systems
4	Role of Technology Upgradation and its impact on banks	<ul style="list-style-type: none"> • Trends in Technology Development • Data Ware house and Data Mining • Role and uses of Technology Upgradation • Management Information System • Global Trends in BFSI • Impact of IT in BFSI • Disaster Recovery and Business Continuity.
5	Security Considerations, Overview of IT act, Preventive Vigilance	<ul style="list-style-type: none"> • Risk Concern Areas – Data and Software, Infrastructure, People ware. • Different types of threats(Accidental and Malicious) • Control Mechanism (Physical, Internal and operational) • Gopalkrishna Committee Recommendations • Information System Audit • Phishing, Customer Education, Safety Checks.

Reference Books:

- Principle and practices of Banking (Indian Institute of Banking and Finance, Mc Millan India)
- Security in Electronic Banking(Indian Institute of Banking and Finance, Mc Millan India)

Data Analytics using R

Sr. No	Module/Units	Detailed Topic wise Syllabus
1.	Data Definitions and Analysis Techniques	Elements, Variables, and Data categorization Levels of Measurement Data management and indexing Introduction to statistical learning and R-Programming
2.	Descriptive Statistics	Measures of central tendency Measures of location of dispersions Practice and analysis with R
3.	Basic Analysis Techniques	Basic analysis techniques Statistical hypothesis generation and testing Chi-Square test t-Test Analysis of variance Correlation analysis Maximum likelihood test Practice and analysis with R
4.	Data analysis techniques	Regression analysis Classification techniques Clustering Association rules analysis Practice and analysis with R
5.	Case studies and projects	Understanding business scenarios Feature engineering and visualization Scalable and parallel computing Sensitivity Analysis
1.	Data Definitions and Analysis Techniques	Elements, Variables, and Data categorization Levels of Measurement Data management and indexing Introduction to statistical learning and R-Programming

Reference Book:

Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking Book by Tom Fawcett

Agile Technology

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	AGILE METHODOLOGY	Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values
2	AGILE PROCESSES	Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.
3	AGILITY AND KNOWLEDGE MANAGEMENT	Agile Information Systems – Agile Decision Making – Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).
4	AGILITY AND REQUIREMENTS ENGINEERING	Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.
5	AGILITY AND QUALITY ASSURANCE	Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development.

Reference Book:

David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Prentice Hall, 2003.

Craig Larman, "Agile and Iterative Development: A Managers Guide", Addison-Wesley, 2004.

Cloud Infrastructure and Services

Sr. No	Module/Units	Detailed Topic wise Syllabus
1.	Introduction to Cloud Technologies	Introduction to the Cloud Computing, history of Cloud Computing, cloud service options, cloud deployment models, business concerns in the cloud.
2.	Virtualization	Introduction to virtualization, implementation levels of virtualization, virtualization at the OS level, virtualization structure (hosted structure, bare-metal structure), virtualization mechanism, virtualization of CPU, memory, and I/O devices.
3.	Cloud Platforms	Cloud computing services (IaaS, PaaS, SaaS, DBaaS), Cloud types and models (private cloud, community cloud, public cloud, hybrids cloud).
4.	Introduction to Amazon Web Services (AWS)	AWS history, AWS infrastructure, AWS services, AWS ecosystem.
5.	Programming, Management Console and Storage on AWS	Basic understanding APIs - AWS programming interfaces, web services, AWS URL naming, matching interfaces and services, elastic
6.	Identity Services, Security and Compliance	Understanding credentials (passwords, access keys, MFA, and certificates), security policies, IAM (Identity and Access Management) abilities and limitations, physical security, Cloud standards and compliance, public/private keys, other security capabilities.
7.	Computing and Marketplace	Introduction to servers, imaging computers, auto scaling, elastic load balancing, cataloging the marketplace, AMIs (Amazon Machine Images), selling on the marketplace.
8.	Networking and Databases	Virtual private clouds, cloud models, private DNS servers, relational database service – DynamoDB, ElastiCache, Redshift.
9	Other Cloud Services and Management Services	Analytics services, application services, cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks.

Reference Book:

Jayaswal, K., Kallakurchi, J., Houde, D.J. and Shah, D., Cloud Computing: Black Book, Wiley India, 2015,

SCALA

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction to SCALA	Functional programming, features, variable and data types, control statements, functions.
2	Object Oriented Programming	Objects, classes, Singleton and Companion Object, Case classes and objects, Constructors, Inheritance, Overloading, Overriding.
3	Exception Handling and Multithreading	Exception handling, mechanisms to handle exceptions, custom exceptions. Thread, methods.
4	Collections	Collection, Set, HashSet, Vector, List, Maps.
5	File Handling	Create, Read, Write a file.

Reference book:

- Beginning Scala (Vishal Layka, David Pollak)
- Functional programming in Scala (Paul Chiusana, Runar Bjarnason)

User Interface Design

Sr. No	Module/Units	Detailed Topic wise Syllabus (In bullet points)
1	XHTML	Appreciate the basic concepts of HTML/CSS fundamentals. Appreciate the syntax and semantics types of Selectors and types of Stylesheets.
2	Java script Basics	Appreciate the basic concepts of Java Script fundamentals. Appreciate the syntax and semantics involved in Objects, Events DOM. Applications of JavaScript.
3	J query	Understand basic of jQuery HTML/CSS Query Form jQuery Events, jQuery UI and their applications to solving problems.
4	XML Advance	Appreciate the basic concepts of Bootstrap fundamentals. Appreciate the syntax and semantics XML CSS Applications of XML Validation, XML Attributes.
5	Bootstrap	Appreciate the basic concepts of Bootstrap fundamentals. Appreciate the syntax and semantics involved in Components, Plugins, Demos. Applications of Bootstrap with CSS.

Reference Books:

- Web Design Technology by D.P NAGPAL
- Lean UX: Designing Great Products with Agile Teams By Jeff Gothelf

LAMP

Sr. No	Module/Units	Detailed Topic wise Syllabus
1	Introduction to LAMP Technology:	Characteristics and Advantage of LAMP Installation and Configuration of LAMP stack. Understanding of Apache Web Server Understanding and setting of various configuration files of LAMP stack.
2	Open Source (Linux):	Overview of open source software Development philosophy, Comparison between open source, Closed source and free software. History of Linux, Features Benefits and Version of Linux Features of Linux file system, commonly used commands.
3	Database Management using MySQL	Installing and configuring of MySQL on Linux, Creating databases, tables, and indexes in MySQL Inserting, deleting and updating data, Querying MySQL Working with advanced queries Understanding the different join types using MySQL Built-in function. PHP my admin to manage MySQL database. MySQL database administration.
4	PHP Programming fundamentals:	Understanding syntax and variables of PHP Control statements and functions Passing information between PHP pages String Handling, arrays, improving PHP/MySQL efficiency.
5	Object Oriented programming and File Handling with PHP :	Basic PHP Constructs for OOP Advanced OOP Features OOP Style in PHP, Advanced Array Functions, String and Regular Expression Functions Handling Session and Cookies in PHP. Understanding PHP File Permissions File Reading and Writing Functions Filesystem and Directory Functions Network Functions, Date and Time Functions
1	Introduction to LAMP Technology:	Characteristics and Advantage of LAMP Installation and Configuration of LAMP stack. Understanding of Apache Web Server Understanding and setting of various configuration files of LAMP stack.

Reference book:

- Programming PHP By Rasmus Lerdorf
- PHP Objects, Patterns, and Practice, Second Edition By Matt Zandstra