SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Master of Computer Applications

Supporting Document for 1.1.2

Syllabus Revision carried out in 2020

Program : MCA- Master of Computer Applications

Regulations: SVEC-20

This document details the following:

1. Courses where syllabus has been changed 20% and more.
2. Course-wise revised syllabus with changes highlighted.

Note: *For SVEC-20 revised syllabus, SVEC-19 (previous syllabus) is the reference.*

List of Courses where Syllabus content has been changed (20% and more)

S.No.	Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
1.	20MC1BS01	Computer Oriented Statistical Techniques	30	02-03
2.	20MC10103	Data Structures and Algorithms	25	05-06
3.	20MC2HS01	Financial And Management Accounting	20	08-09
4.	20MC20103	Cryptography and Network Security	20	11-12
5.	20MC20106	R Programming	100	13-14
6.	20MC20107	Software Architecture And Design Patterns	100	16-17
7.	20MC20108	Cyber Security	40	20
8.	20MC20110	Mobile Application Development	100	22-23
9.	20MC20111	Programming with C#	100	24-25
10.	20MC20112	Software Testing and Quality Assurance	20	29
11.	20MC20132	LINUX Programming Lab	100	30-31
12.	20MC30102	Data Analytics	20	33
13.	20MC30103	Web Programming	50	34-35
14.	20MC30106	DevOps Application Development	100	36-37
15.	20MC30107	Programming with AngularJS	100	38-39
16.	20MC30109	Computer Oriented Optimization Techniques	30	40-41
17.	20MC30110	Full Stack Development	100	42-43
18.	20MC30112	Programming in Ruby	100	44-45
19.	20MC30113	User Interface Design	100	46-47
20.	20MC30132	Web Programming Lab	73	48-50
21.	20MC3AC01	Server Side Development with NodeJS Lab	100	52-53
		Average %**(A)**	68	
		Total No. of Courses in the Program **(T)**	38	
		No. of Courses where syllabus (more than 20% content) has been changed **(N)**	21	-
		Percentage of syllabus content change in the courses **(C)= (A x N)/ 100**	14.28	
		Percentage of Syllabus Content changed in the Program **(P)= C/T*100**	**37.58**	

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Sree Sainath Nagar, A. RANGAMPET
CHITTOOR (DT.)-517 102, A.P.

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(AUTONOMOUS)
Sree Sainath Nagar, A. RANGAMPET
Chittoor (Dist.) - 517 102, A.P., INDIA

MCA I – SEMESTER
(20MC1BS01) COMPUTER ORIENTED STATISTICAL TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Concepts of descriptive statistics; basics in R; Probability distributions; Correlation and Regression analysis; Testing of hypothesis.

COURSE OUTCOMES:

After successful completion of the course students should be able to:

CO1. Understand the concepts of descriptive statistics, basics in R, Probability distributions, Testing of Hypothesis, Correlation and Regression.

CO2. Apply testing of hypothesis on small and large sample tests using Z-test, t-test, F-test and chi-square test to draw the valid inferences and solve the problems on probability distributions.

CO3. Use R programming tools to Simulate Binomial, Poisson and Normal distributions, Calculate Correlation and Regression Coefficients, Fitting lines of Regression.

CO4. Analyze the relationship between variables using Correlation and Regression.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO DESCRIPTIVE STATISTICS (9 Periods)

Measures of Central Tendency: Arithmetic Mean, Arithmetic Mean Computed from Grouped data, Median, Mode, Empirical Relation Between the Mean, Median,and Mode, Geometric Mean, Harmonic Mean.

Measures of Dispersion: The Range, The Mean Deviation, The Semi- Interquartile Range, The Standard Deviation, The Variance, coefficient of variation and Moments, measures of Skewness and Kurtosis.

UNIT II - BASICS IN R (10 Periods)

Introduction, R Studio, how to run R, Variables, Data Types, Vectors, Data Frames, Lists, Matrices, Arrays, Classes, Functions, Graphical and diagrammatical presentations in R.

UNIT III - PROBABILITY DISTRIBUTIONS (8 Periods)

Discrete Probability Distributions: Binomial Distribution- Mean and variance and fitting of Binomial distribution; Poisson distribution -Mean and variance and fitting of Poisson distribution.

Continuous Probability Distributions: Normal Distribution- Mean, variance and area properties of Normal distribution.

Implementing in R: Simulate Binomial, Poisson and Normal distributions

UNIT IV- CORRELATION AND REGRESSION ANALYSIS. (8 Periods)

Correlation Analysis: Linear Correlation, scatter diagram, Karl Pearson's coefficient of Correlation and Spearman's Rank correlation coefficient (with and without tied ranks).

Regression Analysis: Regression Lines, Fitting of two lines of Regression, Regression coefficients and multiple regression

Implementing in R: Calculate Correlation and Regression Coefficients and Fitting lines of Regression

UNIT V - TESTING OF HYPOTHESIS (10 Periods)

Large sample Tests: Null hypothesis and Alternative hypothesis, Type-I and Type-II errors, Level of significance, Critical Region, one tailed and two tailed tests; Test of Significance of single proportion, Difference of two Proportions, Single mean, Difference of two Means.

Small sample tests: t-test: Single mean, Difference of two Means; F-test; chi-square test**:** chi-square test for independence of attributes, chi-square test for goodness of fit.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi etal., *"Probability and Statistics,"* S. Chand and Company ltd: New Delhi, 3rd Edition, 2011.

2. Allerhand M. Tiny Handbook of R – Springer Briefs in Statistics, 2011.

REFERENCE BOOKS:

1. Shanaz Bhatul, *"Probability and Statistics,"* RIDGE Publications, 2nd Edition, 2006.
2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Applied Statistics,"* S. Chand and Sons, New Delhi, 2010.
3. Baayen R. *"Analyzing Linguistic Data - A Practical Introduction to Statistics using R,"* 2008.
4. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters *"Beginner's Guide to R,"* Springer,2009.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/probability-and-statistics.html.
2. https://www.classcentral.com/course/swayam-probability-and-statistics-5228.
3. https://www.coursera.org/browse/data-science/probability-and-statistics.

MCA I-SEMESTER
(20MC10103) DATA STRUCTURES AND ALGORITHMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand the fundamental concepts of data structures, asymptotic notations and algorithm analysis techniques to measure the performance of an algorithm.

CO2. Analyze performance of sorting and searching algorithms by making use of time and space complexity.

CO3. Design algorithms to solve societal problems by applying linked lists

CO4. Solve computational problems by using stacks and queues

CO5. Apply suitable data structure to perform operations on trees and graphs

CO6. Construct hash tables by using Hash functions and relevant collision resolution technique.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION, SORTING AND SEARCHING (11 periods)

Introduction: Introduction to data structures, Introduction to Algorithm, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notation- Big Oh, Omega, Theta notations, Guidelines for Asymptotic Analysis, Algorithms Analysis: Problems and Solutions.

Sorting: Bubble Sort**,** Insertion sort, Selection Sort, Shell Sort, Radix sort and their performance analysis.

Searching: Linear Search, Binary Search and their performance analysis

UNIT II – LINKED LIST (8 periods)

Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List- Sparse Matrix Representation and its performance analysis, Addition of Polynomials and its performance analysis

UNIT III – STACKS AND QUEUES (8 periods)

Stacks: Introduction, Definition, Implementation of stacks using arrays, Implementation of stacks using linked list, Applications of Stacks

Queues: Introduction, Definition, Implementation of queues using arrays, Implementation of queues using linked list, Circular Queue, Deque, Priority Queue, Applications of Queues

UNIT IV – TREES, SEARCH TREES AND HEAPS (9 periods)

Trees: Basic Terminologies, binary trees, Properties of binary tree, Representation of Binary Tree, Binary tree traversals.

Search Trees: Binary Search Trees, Operations on Binary Search Trees, AVL Trees and Operations on AVL trees

Heap: Heap Trees, Implementation of Heap Trees, Applications of Heap – Heap Sort and Its performance Analysis

UNIT V – MULTI WAY TREES, GRAPHS AND HASHING (9 periods)

Multiway Trees: M-way search trees, B-trees, Operations on B-trees, B+-trees

Graphs: Introduction, Basic Terminologies, Representation of Graphs, Breadth First Search and its Complexity Analysis, Depth First Search and its Complexity Analysis

Hashing: Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and their performance analysis.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Debasis Samanta, *"Classic Data Structures,"* PHI Learning private limited, Second Edition, 2017.
2. Narasimha Karumanchi, *"Data Structures and Algorithms made easy,"* Career Monk, 5th Edition, 2017.

REFERENCE BOOKS:

1. G A V Pai*, "Data Structures and Algorithms: Concepts, Techniques and Applications,"* Mc graw Hill Edition.
2. Satraj Sahani, *"Data Structures, Algorithms and Applications in Java,"* Universities Press, 2nd Edition, 2008.
3. Michael T. Goodrich, Roberto Tamassia, *"Data Structures and Algorithms in java,"* Wiley India, 2nd Edition, 2007.

ADDITIONAL LEARNING RESOURCES:

1. https://www.coursera.org › Browse › Computer Science › Algorithms
2. https://nptel.ac.in/courses/106102064
3. https://nptel.ac.in/courses/106103069
4. https://nptel.ac.in/courses/106102064/24
5. https://swayam.gov.in/course/235-data-structure

MCA II – SEMESTER
(20MC2HS01) FINANCIAL AND MANAGEMENT ACCOUNTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE:-

COURSE DESCRIPTION: Accounting concepts, Principles of accountancy, Types of accounts, Journal, Ledger and Trial Balance; Trading account, Profit and Loss account, Balance sheet, Computerized Accounting; Ratio analysis, Types of ratios, Financial analysis through ratios; Break - Even – Analysis, Decision making by using BEA, Capital budgeting techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Demonstrate the concepts of Financial Accounting in preparation of Financial Statements.

CO2. Analyze and interpret the financial data using Ratio Analysis, Break-Even Analysis and CapitalBudgeting Techniques for the decision-making of an Organization.

DETAILED SYLLABUS:

UNIT I- ACCOUNTING (11 Periods)

Meaning and Definition - Objectives – Functions – **Principles of accountancy:** Concepts and Conventions - Double entry system of accounting - Types of accounts – Journal - Ledger and Trial Balance

UNIT II- PREPARATION OF FINANCIAL STATEMENTS (11 Periods)

Trading account - Profit and Loss Account and Balance Sheet (with simple adjustments) – Computerized Accounting – Computerized accounting *Vs.* Manual Accounting - Advantages and Disadvantages –Tally ERP 9.0.

UNIT III- RATIO ANALYSIS (11 Periods)

Ratio Analysis – Advantages and disadvantages of Ratio Analysis –Types of Ratios – Profitability Ratios, Activity Ratios, Liquidity Ratios, Solvency Ratios (Simple Problems)

UNIT IV- BREAK-EVEN-ANALYSIS (11 Periods)

Break-Even-Analysis – Assumptions, Managerial significance of Break-Even-Analysis – Concept of Break Even Point (BEP) – Break-Even Chart –Determination of BEP – Profit/Volume (P/V) ratio – Margin of safety (Simple Problems).

NIT V- CAPITAL BUDGETING (11 Periods)

Features, Proposals, **Methods of Capital Budgeting:** Payback Period Method –Accounting Rate of Return (ARR) – Time value of money – Net Present Value Method (NPV) – Profitability Index (PI) – Internal Rate of Return (IRR) (Simple problems)

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Tyagi, C.L. and MadhuTyagi, "*Financial and Management Accounting*," Atlantic Publishers and Distributors, New Delhi, 2016.
2. Madhuvij, "*Financial and Management Accounting*," Anmol Publishers New Delhi, 11th Edition, 2018.

REFERENCE BOOKS:

1. Pauline Weetman, "*Financial and Management Accounting – An Introduction*," Financial Times Prentice Hall, New Delhi, 4th edition, 2014.
2. Jain, S.P. and Narang, K.L., "*Financial Accounting*," Kalyani Publishers, Ludhiana, 2th Edition, 2016.

MCA II- SEMESTER
(20MC20103) CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective – I)

Int.	Ext.	Total	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A course on Computer Networks.

COURSE DESCRIPTION:

Cryptographic algorithms; Classical Encryption Techniques; Public key and Private key encryption; Security models; Hash Algorithms; E-mail, IP and Web Security; ensuring system security and security over the Internet; Intrusion Detection and Trusted systems.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand Network security model and cryptographic techniques for secure communication.

CO2. Apply Cryptographic techniques to provide security for E-Mail and IP based communication.

CO3. Analyze Cryptographic algorithms and provide solutions for secure data transmission.

CO4. Use web and system security techniques to prevent the data from digital attacks.

DETAILED SYLLABUS:

UNIT I- COMPUTER AND NETWORK SECURITY CONCEPTS AND CLASSICAL ENCRYPTION TECHNIQUES (09 Periods)

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, A Model for Network Security, Standards.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques – Caesar Cipher, Monoalphabetic Ciphers, Polyalphabetic Ciphers, Playfair Cipher and Transposition Techniques.

UNIT II- CONFIDENTIALITY USING SYMMETRIC AND ASYMMETRIC CIPHERS (13 Periods)

Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure, The Data Encryption Standard (DES), The Strength of DES, Block Cipher Design Principles.

Advanced Encryption Standard and Block Cipher Operation: AES Structure, Multiple Encryption and Triple DES, Electronic Codebook, Cipher Block Chaining Mode, Cipher

Feedback Mode, Output Feedback Mode and Counter Mode. Stream Ciphers and RC4, Placement of Encryption Function, Traffic Confidentiality.

Public-Key Cryptography: Principles of Public-Key Cryptosystems, Public-Key Cryptographic algorithms - The RSA Algorithm, Diffie – Hellman Key Exchange.

Case Study: Implement RSA and Diffie – Hellman Key Exchange algorithms.

UNIT III-CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS AND MUTUAL TRUST (14 Periods)

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining and Secure Hash Algorithm (SHA).

Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC and MACs Based on Block Ciphers: DAA and CMAC.

Digital Signatures: Digital Signatures, NIST Digital Signature Algorithm.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates and Public-Key Infrastructure.

User Authentication: Remote User – Authentication Principles, Kerberos, Federated Identity Management, Personal Identity Verification.

Case Study: To check the integrity of files in a system using any open source security algorithm.

UNIT IV- ELECTRONIC MAIL SECURITY AND IP SECURITY (09 Periods)

Electronic Mail Security: Email Threats and Comprehensive Email Security, S/MIME and Pretty Good Privacy (PGP).

IP Security: IP Security Overview, IP Security Policy, Authentication Header (AH), Encapsulating Security Payload (ESP), Combining Security Associations and Internet Key Exchange.

UNIT V- WEB SECURITY AND SYSTEM SECURITY (10 Periods)

Transport-Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

System Security: Intruders, Intrusion Detection systems, Viruses and Related Threats, Virus Countermeasures, Firewall Design Principles, Trusted Systems.

Case Study: A study on Challenges to mitigate security risks associated with digital

Payments.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. William Stallings, "*Cryptography and Network Security (Principles and Practice)*", Pearson Education, 7th Edition, 2020.
2. William Stallings, "*Cryptography and Network Security*", Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. William Stallings, "*Network Security Essentials (Applications and Standards)*", Pearson Education, 3rd Edition, 2009.
2. Bernard L. Menezes, Ravinder Kumar, "*Cryptography, Network Security and Cyber Laws*", Cengage Learning, 2019.
3. Behrouz A. Forouzan, "*Cryptography and Network Security*", Tata McGraw-Hill, 2007.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106/105/106105031/ lecture by Dr. Debdeep Mukhopadhyay, IIT Kharagpur
2. https://www.udemy.com/introduction-to-cryptography-online-course-rahsoft-crypto-certificate/ by Dr. Sourabh Prakash Head of Rahsoft Cyber Security and Cryprography Department
3. https://www.coursera.org/learn/asymmetric-cryptography offered by university of Colorado
4. https://www.khanacademy.org/computing/computer-science/cryptography- Journey into Cryptography.

MCA II - SEMESTER

(20MC20106) **R PROGRAMMING**

(Professional Elective –I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on Computer Oriented Statistical Techniques and Object Oriented Programming through JAVA.

COURSE DESCRIPTION: Overview of R; R Data Structures; Vectors; Matrices and Arrays; Lists; Creating Data Frames; Factors and Tables; R Programming Structures; Object-Oriented Programming; Input/output; String Manipulation and Graphics.

COURSE OUTCOMES:

After successful completion of the course students should be able to

CO1. Understand R programming concepts Run R, Interactive Mode, Batch Mode, data structures, R Programming Structures concepts Control Statements, Arithmetic and Boolean Operators and Values.

CO2. Use R tool to perform Vectors, Structures, Data Frames, Factors and Tables for statistical data analysis and modelling.

CO3. Design and develop R programs using Input/output and String Manipulation functions.

CO4. Analyze and apply Graphics functions for visualizing data and model output.

CO5. Select and apply S3 and S4 Classes to develop object oriented programming in R to solve problems.

DETAILED SYLLABUS:

UNIT I- OVERVIEW OF R AND VECTORS (10 Periods)

OVERVIEW OF R: Run R, Interactive Mode, Batch Mode, Basic R Session, Functions, R Data Structures, help() Function, example() Function.

VECTORS: Scalars, Vectors, Arrays, and Matrices, Declarations, Recycling, Common Vector Operations, Vectorized Operations, NA and NULL Values, Filtering.

UNIT II- MATRICES, ARRAYS and LISTS (11 Periods)

MATRICES AND ARRAYS: Creating Matrices, General Matrix Operations, Applying Functions to Matrix Rows and Columns, Adding and Deleting Matrix Rows and Columns.

LISTS: Creating Lists, General List Operations, Accessing List Components and Values, Applying Functions to Lists, Recursive Lists.

UNIT III- DATA FRAMES, FACTORS AND TABLES (11 Periods)

DATA FRAMES: Creating Data Frames, Other Matrix-Like Operations, Merging Data Frames.

FACTORS AND TABLES: Factors and Levels, Common Functions Used with Factors, Working with Tables, Other Factor- and Table-Related Functions.

UNIT IV- R PROGRAMMING STRUCTURES (11 Periods)

R PROGRAMMING STRUCTURES: Control Statements, Arithmetic and Boolean Operators and Values. Default Values for Arguments, Return, Functions Are Objects, No Pointers in R, Recursion, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions, Sorting, Linear Algebra Operations on Vectors and Matrices, Set Operations, Simulation Programming in R.

UNIT V- OBJECT-ORIENTED PROGRAMMING, INPUT/OUTPUT, STRING MANIPULATION AND GRAPHICS (12 Periods)

OBJECT-ORIENTED PROGRAMMING: S3 Classes, S4 Classes, S3 Versus S4, Managing Objects.

INPUT/OUTPUT : Accessing the Keyboard and Monitor, Reading and Writing Files,

STRING MANIPULATION: String-Manipulation Functions- grep(), nchar(), paste(), sprintf(), substr(), strsplit(), regexpr(), gregexpr()

GRAPHICS: Creating Graphs, The plot() Function The abline() Function, The points() Function,The legend() Function, The text() Function, Customizing Graphs, Saving Graphs to Files.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Norman Matloff, *"The Art of R Programming",* William Pollock, 2011.

REFERENCE BOOKS:

1. Dr. Mark Gardener, "*Beginning R the statistical programming language",* Wiley Publications,2015.

2**.** Garrett Grolemund *"Hands-On Programming with R"* O'Reilly Media, Inc, 2014.

ADDITIONAL LEARNING RESOURCES:

https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf

MCA II- SEMESTER

(20MC20107) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

(Professional Elective –I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Software Engineering.

COURSE DESCRIPTION:

Design patterns, Catalog of design pattern, object-oriented development, Analysis of System, Creational Patterns, Structural patterns, Interactive systems and MVC Architecture, Designing with Distributed Objects.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Understand interactive systems, MVC architecture, range of design patterns, code qualities needed to keep code flexible.

CO2. Design system and subsystem with distributed objects and implement codes with higher performance and lower complexity.

CO3. Analyze system design principles and assess the quality of a design with respect to principles.

CO4. Select and apply suitable pattern from design patterns catalog in specific contexts to solve design problems.

DETAILED SYLLABUS:

UNIT-I: DESIGN PATTERNS (11 Periods)

Design patterns: Design Pattern, Catalog of design pattern, organizing the catalog, solve design problems using design patterns, selection of design pattern, use of design pattern; object-oriented development, key concepts of object oriented design, benefits and drawbacks of the paradigm.

UNIT II - ANALYSIS OF SYSTEM (11 Periods)

Analysis of System: Overview of the analysis phase, stage 1: gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain; Design and Implementation, discussions and further reading.

UNIT III- DESIGN PATTERN CATALOG (11 Periods)

Design Pattern Catalog: Creational Patterns: Abstract factory, Builder, Factory method, Prototype, Singleton; Structural patterns: Adapter, bridge, composite, decorator, facade, flyweight, proxy.

UNIT IV- INTERACTIVE SYSTEMS AND THE MVC ARCHITECTURE (11 Periods)

Interactive systems and the MVC Architecture: Introduction, The MVC architectural pattern, analyzing a simple drawing program, designing the system, designing of the subsystems, getting into implementation, implementing undo operation, drawing incomplete items, adding a new feature, pattern based solutions.

UNIT V - DESIGNING WITH DISTRIBUTED OBJECTS (11 Periods)

Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web a note on input and output, selection statements, loops arrays.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Brahma Dathan, Sarnath Rammath, *"Object-oriented analysis, design and implementation,"* Universities Press (India) Private Ltd, 2nd Edition, 2015.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *"Design patterns,"* Pearson Publication, 2013.

REFERENCE BOOKS:

1. Frank Bachmann, Regine Meunier, Hans Rohnert *"Pattern Oriented Software Architecture,"* Volume 1, 1996.
2. William J Brown et al., "*Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis",* John Wiley, 1998.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/content/storage2/courses/106105087/pdf/m08L18.pdf
2. http://nptelvideos.com/video.php?id=916
3. https://freevideolectures.com/course/2318/software-engineering/15
4. https://www.coursera.org/learn/design-patterns

MCA II-SEMESTER

(20MC20108) **CYBER SECURITY**

(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Computer Networks

COURSE DESCRIPTION:

Computer Security and threats, Browser Attacks, Privacy Impacts of Emerging Technologies, Managing the incidents, Computer Forensics technologies and Cyber Crimes, Computer Forensic Evidences and Investigations

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Understand the concepts of Threats, Harm, Vulnerabilities, Computer Forensics Fundamentals and Forensics evidences for providing Cyber Security.

CO2. Analyze Internet of Things, Economics, Electronic Voting, Cyber Warfare and privacy impacts of emerging techniques to identify the critical issues.

CO3. Use Forensic SIM, WinHex and forensic techniques to acquire and verify the evidence.

CO4. Commit ethics of cyber regulations, responsibilities, and norms to manage incidents using privacy principles, policies, Cyber Welfare and International Laws to adapt in cyberspace and follow law of enforcement standards for digital Forensics and crime investigations.

DETAILED SYLLABUS:

UNIT I– CYBER SECURITY (10 periods)

Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography, Web User Side, Browser Attacks, Web attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

UNIT II – PRIVACY IN CYBERSPACE (9 periods)

Privacy Concepts ,Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

UNIT III – MANAGEMENT AND INCIDENTS (12 periods)

Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster, Emerging Technologies, The Internet of Things, Economics, Electronic Voting, Cyber Warfare, Cyberspace and the Law, International Laws, Cyber Warfare and Home Land Security.

UNIT IV- COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME (12 periods)

computer Forensics fundamentals , Use of computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists, Types of Military Computer Forensic Technology, Types of Law Enforcement - Computer Forensic Technology, Types of Business Computer Forensic Technology, occurrence of Cybercrime, Cyber Detectives, Cyber Crime with risk management techniques.

UNIT V- COMPUTER FORENSICS EVIDENCE AND TOOLS (12 periods)

Importance of Collecting Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination- The Chain of Custody; Duplication and preservation of digital evidence- Preserving the digital crime scene; Computer evidence processing steps; Forensic Card Reader, Cell Seizure, MOBILedit, Forensic SIM, WinHex.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, *"Security in Computing,"* 5th Edition, Pearson Education, 2015.
2. John R.Vacca, *"Computer Forensics, Computer Crime Scene Investigation",* Firewall Media, 2009.

REFERENCE BOOKS:

1. George K.Kostopoulous, *"Cyber Space and Cyber Security,"* CRC Press, 2013.
2. MarttiLehto, PekkaNeittaanmäki, *"Cyber Security: Analytics, Technology and Automation"*, Springer International Publishing Switzerland, 2015.
3. Bill Nelson, Amelia Phillips, Christopher Steuart, *"Guide to Computer Forensics and Investigations"*, Cengage Learning,*4th* Edition, 2009.
4. Chris Prosise, Kevin Mandia, *"Incident Response and Computer Forensics"*, McGraw-Hill Osborne Media, 2nd Edition, July 2003.

5. EoghanCasey,*"Handbook Computer Crime Investigation's Forensic Tools and Technology",* Academic Press, 2001.

ADDITIONAL LEARNING RESOURCES:

1. https://www.edx.org/course/cyber,security,basics,a,hands,on,approach.
2. https://www.cyberaces.org/courses/
3. https://www.futurelearn.com/courses/introduction,to,cyber,security
4. https://swayam.gov.in/nd2_cec20_cs09/preview

MCA II- SEMESTER

(20MC20110) MOBILE APPLICATION DEVELOPMENT

(Professional Elective –II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on Object Oriented Programming through Java.

COURSE DESCRIPTION:

Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- **CO1.** Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
- **CO2.** Design user interfaces by analyzing user requirements.
- **CO3.** Develop mobile applications and publish in different mobile platforms.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION AND MOBILE USER INTERFACE DESIGN (10 periods)

Mobile web presence, Mobile applications, Marketing, App as a mobile web app; User interface design - Effective use of screen real estate, Mobile application users, Mobile information design, Mobile platforms, Tools of mobile interface design.

Android versions, Features and architecture, required tools, Android application launching.

UNIT II- ACTIVITIES, INTENTS AND ANDROID USER INTERFACE (11 periods)

Activities, Linking activities using intents, Calling Built – In Applications Using Intents, Displaying notifications, Components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the action bar, Listening for UI notifications.

UNIT III- ADVANCED USER INTERFACE AND DATA PERSISTENCE (12 periods)

Basic views, Picker views, List view, Image view, Menus with views, Web view, Saving and loading user preferences, Persisting data to files, Creating and using databases.

UNIT IV- MESSAGING, LOCATION-BASED SERVICES, AND NETWORKING

(11 Periods)

SMS messaging, sending e-mail, Displaying maps, Getting location data, Monitoring a location, Consuming web services using HTTP.

UNIT V- ANDROID SERVICES, PUBLISHING ANDROID APPLICATIONS AND IOS

(11 Periods)

Services, Communication between a service and an activity, Binding activities to services, Threading, Preparing for publishing, Deploying APK files.

iOS tools, iOS project, Debugging iOS apps, Objective-C basics, Hello world app, Building the derby app in iOS.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. J. F. DiMarzio, "*Beginning Android Programming with Android Studio,*" Wiley India, 4th Edition, 2017.
2. Wei – Meng Lee, "*Beginning Android 4 Application Development",* Wrox, 2017.

REFERENCE BOOKS:

1. Jeff McWherter and Scott Gowell, *"Professional Mobile Application Development,"* Wiley India, 1st Edition, 2012.
2. Neils Smyth *"Android Stduio Development Essentials,"* Creative Space Independent publishing platform, 7th Edition 2016.
3. Paul Deital and Harvey Deital, *"Android How to Program,"* Detial associates publishers, 1st Edition, 2013.

ADDITIONAL LEARNING RESOURCES:

1. https://www.youtube.com/playlist?list=PLknSwrodgQ72X4sKpzf5vT8kY80HKcUSe
2. https://developer.android.com/

MCA II-SEMESTER

(20MC20111) **PROGRAMMING WITH C#**

(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:

Course on Object Oriented Programming through Java.

COURSE DESCRIPTION:

Introduction to .NET and Building blocks to the .NET Platform; Concepts of C# Programming; Implementation of interfaces, creating custom delegates and Events; Applications on ADO.NET; Design and development of ASP.NET Web Forms.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Understand .NET Framework, principles of C#, Microsoft Visual C# and Visual Studio.

CO2. Design and develop web applications using ADO.NET and ASP.NET.

CO3. Use Microsoft Visual Studio tool to develop web applications.

CO4. Analyze mechanisms of ASP.NET and web controls, sessions and cookies techniques to design Client/Server applications.

CO5. Investigate object oriented programming principles to solve Exception Handling and Multithreading problems to implement C# Programming.

CO6. Commit to Key security standards of .NET to design secure web applications for an individual and society.

DETAILED SYLLABUS:

UNIT I- INTRODUCING C# AND .NET PLATFORM (11 Periods)

Benefits of the .NET platform, Building blocks of the .NET platform, Overview of .NET assemblies, Common type system, Common language specification, Common language runtime, Platform-independent nature of .NET, Introduction to Visual Studio. The role of the .NET framework, Building .NET application using visual studio, Anatomy of a simple c# program, System. Console class, System data types and corresponding c# keywords. Working with string data, C# iteration constructs Decision constructs and the Relational/equality operators.

UNIT II- CORE C# PROGRAMMING, OOP WITH C# AND EXCEPTION HANDLING (11 Periods)

Understanding C# arrays, C# class type, Constructors, this keyword, static keyword, Pillars of OOP, C# access modifiers, C# encapsulation services, Understanding automatic properties , mechanics of inheritance , C#'s polymorphic support. Role of .NET Exception Handling, example, System-level exceptions, Application level exceptions, processing multiple exceptions.

UNIT III- INTERFACES, GENERICS, DELEGATES AND EVENTS (11 Periods)

Understanding interface types, Defining custom interfaces, Implementing an interface, Implementing an interfaces using visual studio, Role of generic type parameters , Creating custom generic methods, Creating custom generic structures and classes, Understanding the .NET delegate type, Delegate example, Generic delegate, and C #events , Understanding operator overloading.

UNIT IV- ADO.NET (11 Periods)

High level definition of ADO.NET, ADO.NET data provider, ADO.NET namespaces, Connected layer of ADO.NET, Data Readers , Database transactions, Disconnected layer of ADO.NET, Role of the dataset, Working with DataColumns, Data Rows, DataTable , Binding DataTable objects to windows forms GUIs, DataAdapters.

UNIT V -ASP.NET WEB PAGES AND WEB CONTROLS (11 Periods)

ASP.NET, ASP.NET web forms, Role of http, Web applications and web servers, Role of client side scripting, Posting back to the web server. Overview of ASP.NET API, Building a single file ASP.NET web page, building an ASP.NET webpage using Code Files, ASP.NET web sites vs. ASP.NET Web applications, ASP.NET web site directory structure, The life cycle of an ASP.NET web page, Role of the web.config file, Understanding the nature of web controls, Major categories of ASP.NET web control, The Role of validation controls, Maintaining session data and Cookies.

Key Security Concepts in .NET: Type safety and security, Principle, Authentication and Authorization.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Andrew Troelsen, *"Pro C# 5.0 and the .NET 4.5 Framework,"* 6th Edition, Apress, 2013.

REFERENCE BOOKS:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, *"Professional C# 4 and .NET 4,"* Wrox Publications, 2010, ISBN: 978-0-470-50225-9.
2. Mathew Mac Donald "*The Complete Reference ASP.NET,"* TATA McGraw Hill, 2010.

ADDITIONAL REFERENCE

https://docs.microsoft.com/en-us/dotnet/standard/security/key-security-concepts

MCA II-SEMESTER
(20MC20112) SOFTWARE TESTING AND QUALITY ASSURANCE
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:

Software Testing basics: Goals, Defects, Terminology, Methodology, Software Testing Life Cycle (STLC) in Software Development Life Cycle (SDLC), Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines, Software Quality Assurance.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand concepts of Software Testing, Terminology and Methodology, Test Management and Metrics to analyze Software testing and Software Quality Assurance concepts for maintain the quality of the software.

CO2. Use testing tools such as Unified Functional Testing (UFT)/ Rational Functional Tester (RFT)/Selenium to control and monitor the functional testing for Airline Reservation System.

CO3. Analyze Testing Techniques, Static testing, Efficient Test Suit Management and Regression Testing and Test Automation strategies to Synthesis the quality of software.

CO4. Analyze and apply the Software Quality Factors, Pre-project software quality components, Ishikawa's Seven Basics to maintain the quality of the software.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO SOFTWARE TESTING (10 periods)

Evolution of Software Testing, Software Testing: Myths and Facts; Goals of software testing, Psychology for software testing, Software testing definitions, Model for software testing, Effective software testing vs. exhaustive software testing, Effective testing is hard, Software testing as a process.

Terminology and Methodology: Software testing terminology, Software Testing Life Cycle (STLC), Software testing methodology.

UNIT II- TESTING TECHNIQUES (12 periods)

White Box Testing

Need of white-box testing, Logic coverage criteria, basis path testing, Graph matrices, Loop testing, Data flow testing, Mutation testing.

Black Box Testing

Boundary Value Analysis (BVA), Equivalence class testing, State table-based testing, Decision table-based testing, Cause-effect graphing based testing, Error guessing.

UNIT III - SOFTWARE TEST MANAGEMENT AND METRICS (11 periods)

Test Management: Test organization, Structure of testing group, Test planning, detailed test design, Test specifications.

Software Metrics: Definition of software metrics, Classification of software metrics, Size metrics.

Efficient Test Suit Management: Minimizing Test Suite and benefits, Test Suit Minimization problem, Test suite Prioritization, Types of Test case prioritization, Prioritization Techniques.

UNIT IV - REGRESSION AND AUTOMATION (10 periods)

Static Testing: Inspections, Walkthroughs, Technical reviews.

Regression Testing: Progressive vs. regressive testing, Regression testing produces quality software, Regression testability, Objectives of regression testing, Regression testing types, Define regression test problem, Regression testing techniques.

Automation and Testing Tools: Need for automation, Categorization of testing tools, Selection of testing tools, Costs incurred in testing tools, Guidelines for automated testing, Overview of commercial testing tools.

UNIT V- SOFTWARE QUALITY ASSURANCE (12 Periods)

Software Quality Assurance: The software quality challenge, Meaning of software quality, Software quality factors , Software Quality Lessons Learned, The components of the software quality assurance system, Pre-project software quality components: Contract Review, Development and quality plans, SQA components in the project life cycle: Integrating quality activities in the project life cycle, Assuring the quality of software maintenance components, Assuring the quality of external participants' contributions, CASE tools, Software quality infrastructure components, Pareto Principles, Total Quality Management, Ishikawa's Seven Basics.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Naresh Chauhan, "*Software Testing: Principles and Practices*," Oxford University Press, 2nd Edition, 2016.
2. Daniel Galin, "*Software Quality Assurance: From theory to implementation*," Pearson Education Limited, 2004, ISBN 0201 70945 7.

REFERENCE BOOKS:

1. KshirasagarNaik, Priyadarshi Tripathy, "*Software Testing and Quality Assurance-Theory and Practice,"* John Wiley and Sons, Inc., 2008, ISBN 978-0-471-78911-6 2.
2. Fenton, Pfleeger, "*Software Metrics: A Rigourous and practical Approach*", Thomson Brooks/Cole, ISBN 981-240-385-X.
3. Boris Beizer, "*Software Testing Techniques*," Dream Tech Press, 2nd Edition, 2004.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106/105/106105150/
2. https://www.toolsqa.com/software-testing-tutorial/
3. https://www.softwaretestinghelp.com/manual-testing-tutorial-1/
4. https://www.softwaretestinghelp.com/selenium-tutorial-1/

MCA II-SEMESTER
(20MC20132) LINUX PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PREREQUISITES: --

COURSE DESCRIPTION: LINUX operating system features; LINUX environment; Vi-editor; Types of shell; Shell Script; Scheduling Algorithms; Disk Scheduling Algorithm; Synchronization Problems; Page Replacement Algorithms; Deadlocks ; Memory Management Techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Demonstrate LINUX operating system concepts and File Handling, Disk, Text Processing and Backup, awk and Bourne shell.

CO2. Use the vi editor to execute commands and implement programs in shell script.

CO3. Implement LINUX file API's and process API's in LINUX operating system.

CO4. Investigate and select appropriate technique from semaphores, Messages and Shared Memory to solve the problems in Inter Process Communication.

CO5. Work independently or in teams to solve problems with effective Communication.

LIST OF EXERCISES:

1. Execute the following Linux commands.
   a) File Handling Utilities and Disk utilities
   b) Text Processing Utilities and Backup utilities
2. a) Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
   b) Write a shell script that deletes all lines containing the specified word in one or more files supplied as arguments to it.
3. a) Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
   b) Write a shell script to find factorial of a given number.

4. Write an awk script to implement below using case control structure.
   a) Splitting a Line Into Fields
   b) Print multiplication table of a given number
5. Write a C Program to implement FIFO scheduling algorithm.
6. Write a C program to implement LOOK disk scheduling algorithm.
7. Write a C program to implement producer and consumer problem using semaphore.
8. Write a C program to which illustrates inter process communication between using parent and child using pipes.
9. Write a C program to implement internal and external fragmentation concepts.
10. Write a C program to implement banker's algorithm.
11. Write a C program to implement first fit, best fit and worst fit dynamic memory allocation strategies.
12. Write a C program to implement FIFO page replacement algorithms.

REFERENCE BOOKS:

1. W.R. Stevens, "*UNIX Network Programming*," Pearson Education, 2008
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "*Operating System Concepts,"* John Wiley and Sons. Inc, 8th Edition, 2009.
3. Graham Glass, King Ables, "*UNIX for programmers and users,*" Pearson Education, 3rd Edition, 2003.
4. Kernighan and Pike, "*UNIX programming environment*," Pearson Education, 2006.

MCA III- SEMESTER
(20MC30102) **DATA ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on Data Warehousing and Data Mining and Object Oriented Programming through JAVA.

COURSE DESCRIPTION:

Big Data Analytics usage and Outcomes; Types of Big Data; Challenges of analyzing Big Data; Analytics tools for Big Data; Requirements of Hadoop; Adapting Hadoop File systems and I/O; MapReduce Application; Administration of Hadoop; Big Data analytics; HIVE on Hadoop.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

- **CO1.** Demonstrate concepts of Hive, Big Data Analytics, Life cycle, techniques, Integrated Development Environment (IDE) and trends to use MapReduce framework, HDFS and Apache Hive
- **CO2.** Apply Hadoop, Hive QL Indexes and Eclipse IDE tools to perform analytics on Hadoop platform to infer insights of Big Data applications.
- **CO3.** Implement Hadoop features, Hadoop Distributed File system, Hadoop I/O and administering Hadoop to develop applications in Hadoop Environment.
- **CO4.** Analyze Map Reduce framework, varieties of data formats, Methods, Dimensions, and practices to manage Weather sensors data and preprocess data for map reduce applications.
- **CO5.** Apply Hive QL Data types, Tables, Queries and User defined functions to process and analyze data.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO DATA ANALYTICS (11 periods)

Big Data Analytics: Concepts of Big Data Analytics, State of the practice in analytics; Data Analysis Life Cycle: Life cycle, discovery, data preparation, model planning, model building, communicating result, operationalization, Big Data Analytics Examples, Big Data Analytics Solutions.

Meet Hadoop: Data Storage and Analysis, Comparison with Other Systems, History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

UNIT II- HADOOP (10 Periods)

MapReduce: A Weather Dataset Ecosystem, Analyzing the Data with UNIX Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

The Hadoop Distributed File system: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems.
Hadoop I/O: Data Integrity, Compression, Serialization, File-Based Data Structures.

UNIT III- APPLICATIONS OF HADOOP MAPREDUCE (11 Periods)

Developing a MapReduce Application: The Configuration API, Configuring the development Environment, Writing a Unit Test, Running Locally on Test Data, Running on a Cluster.
How MapReduce Works: Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution.
MapReduce Types and Formats: MapReduce Types, Input Formats, Output Formats.

UNIT IV- FEATURES OF MAP REDUCE AND SETTING UP HADOOP CLUSTER (11 Periods)

MapReduce Features: Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes.
Setting Up a Hadoop Cluster: Cluster Specification, Cluster Setup and Installation, SSH Configuration, Hadoop Configuration, Security, Benchmarking a Hadoop Cluster, HDFS, Hadoop in the Cloud.
Case Study: Applications on Big Data Using Hadoop and its supporting Tools.

UNIT V- APACHE HIVE (12 Periods)
Apache Hive: Comparison with traditional databases, Hive QL-Datatypes, operators and functions, Tables- Managing tables, partitions and Buckets, storage formats, inserting, altering and dropping tables, Querying Data-sorting and aggregating, joins subqueries, views, User defined functions-writing UDF and WDAF.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide,*" O'Reilly and Yahoo press, 3rd Edition, 2012.
2. EMC Education services, "Data Science and Big Data analytics," John wiley publications, 2015.

REFERENCE BOOKS:

1. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, 2012.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman, "*Big Data for Dummies,*" John Wiley & Sons, Inc., 2013.

ADDITIONAL LEARNING RESOURCES:

1. https://www.ngdata.com/big-data-analysis-resources/
2. https://www.analyticsvidhya.com/resources-big-data/
3. https://hadoop.apache.org/docs/r3.1.3/
4. https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf

MCA III-SEMESTER
(20MC30103) **WEB PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: A Course on "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Concepts of HTML; Java Script; Developing Web Applications using Servlets, JSP and PHP; Adopting Tomcat Server and XAMP Server for deploying Web Applications.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

- **CO1.** Demonstrate knowledge on HTML5, Java Script, AJAX programming.
- **CO2.** Design and develop web Applications using HTML5, JavaScript, Servlets, JSP and PHP
- **CO3.** Apply JSP and PHP technologies to implement Societal E-Commerce applications to infer potential insights.
- **CO4.** Analyze 2-tier, 3-tier and MVC architectures, Servlets Life cycle and JSP Life cycle, Directory structure of servlets and JSP to design web application.
- **CO5.** Analyze and Solve real time problems using Server-side technologies, Tomcat Server and XAMPP Server for deployment of web applications.
- **CO6.** Adhere to ethics and adapt JSP Standard Tag Libraries, PHP Standard Recommendations (PSR) to develop web application.

DETAILED SYLLABUS:

UNIT I- HTML5 and STYLE SHEETS (12 Periods)

Fundamentals of HTML, Working with text, organizing text in HTML, Working with links and URLs, Creating tables, working with images, Canvas, Forms, Frames and Multimedia. **HTML5:**HTML5 document structure, Creating editable content, Checking spelling mistakes, Exploring custom data attributes Client-Side storage, Drag and drop feature, Offline web applications, Web communications, Cross-Document messaging and desktop notifications. **Style Sheets** : Need for CSS, concepts of CSS, basic syntax and structure, usage of CSS, background images, colors and properties, manipulating texts, usage of fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, concepts and features of CSS3.

UNIT II- JAVASCRIPT (10 Periods)

JavaScript : Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms

and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons, Concepts of AJAX.

UNIT III- SERVLETS **(11 Periods)**

Servlets, Exploring the Servlet API, Servlet Life Cycle, Configuring Servlet in web.xml, Working with ServletConfig and ServletContext Objects, Creating a Simple Servlet, Session Tracking, JDBC, JDBC Drivers, Connections, statements, Result sets, Transactions and Store procedure.

UNIT IV- JSP **(10 Periods)**

JSP, JSP Life Cycle, Creating Simple JSP Pages, Working with JSP Basic Tags and Implicit Objects, Usage of JavaBeans and Action Tags in JSP, Usage of JSP Standard Tag Library [JSTL], JSTL Core Tags, JSTL SQL Tags.

UNIT V- PHP AND MYSQL **(12 Periods)**

PHP : Concepts and syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP and PHP Standard Recommendation (PSR).

PHP AND MYSQL : Commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book,"* Dreamtech Press, 2011.

REFERENCE BOOKS:

1. H. M. Deitel, P.J. Deitel, and T. R. Nieto, "*Internet and World Wide Web – How to program,"* Pearson Education, 2006.
2. Steven Holzner, "*The Complete Reference PHP*," Tata McGraw-Hill Education Pvt. Ltd., 2007.
3. Uttam K Roy, "*Web Technologies*," Oxford University Press, 2010.

ADDITIONAL LEARNING RESOURCES:

1. https://www.w3schools.com/html/
2. https://www.tutorialspoint.com/javascript/index.htm
3. https://www.javatpoint.com/servlet-tutorial
4. https://www.w3schools.com/php/DEFAULT.asp

MCA III - SEMESTER
(20MC30106) DEVOPS APPLICATION DEVELOPMENT
(Professional Elective - III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on "Machine Learning" and "Web Programming".

COURSE DESCRIPTION:

DevOps Perspective; DevOps and Agile; Team Structure; Coordination; Cloud as a Platform; A unified process between development and operations; Architecture; Building and Testing; Configuration and Deployment; Monitoring; Security and Security Audits; Ilities and Business Considerations.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate the concepts of Agile, Team Structure, Coordination, Crosscutting Aspects and monitoring for Devops usage in programming.
CO2. Identify and Analyse the Cloud as a Platform, Overall Architecture, A unified process between development and operations for DevOps application.
CO3. Design applications by applying the tools of tracking production, aligning, release management, configuration management, deployment and monitoring. UNIT-III,
CO4. Develop the applications through the deployment pipelines, test the applications to provide simulated experience.
CO5. Analyse monitoring, Security and Security Audits, Ilities and Business Considerations to solve problems.

DETAILED SYLLABUS:

UNIT I- INTRODUCTION TO DEVOPS (10 Periods)

Concepts of DevOps, DevOps Perspective, DevOps and Agile, Team Structure, Coordination, Barriers, value, building blocks, and best practices of DevOps.
Cloud as a Platform: Features of the Cloud, DevOps Consequences of the Unique Cloud Features

UNIT II- A UNIFIED PROCESS BETWEEN DEVELOPMENT AND OPERATIONS AND OVERALL ARCHITECTURE (11 Periods)

A unified process between development and operations: Agile software development process applied to DevOps, importance of integrating source control in DevOps, Automation applied to DevOps, Operations Services, Service Operation Functions, Continual Service Improvement, Operations and DevOps.

Overall Architecture: DevOps Practices, Overall Architecture Structure, Quality discussion of Microservice Architecture, Amazon's Rules for Teams, Microservice Adoption for Existing Systems.

UNIT III- BUILDING, TESTING AND DEPLOYMENT (12 Periods)

Building and Testing: Moving a System Through the Deployment Pipeline, Crosscutting Aspects, Development and Pre-commit Testing, Build and Integration Testing, UAT/Staging/Performance Testing, Production, Incidents; Configuration management and release management-concepts, benefits, tools and practices of implementing release management and configuration management.

Deployment: Strategies for Managing a Deployment, Logical Consistency, Packaging, Deploying to Multiple Environments, Partial Deployment, Rollback, Tools.

UNIT IV- MONITORING, SECURITY AND SECURITY AUDITS (12 Periods)

Monitoring: working of Monitoring, Change the Monitoring Configuration, Interpreting Monitoring Data, Challenges, Tools, Diagnosing an Anomaly from Monitoring, Data—the Case of Platformer.com

Security and Security Audits: Security concepts, Threats, Resources to Be Protected, Security Roles and Activities, Identity Management, Access Control, Detection, Auditing, and Denial of Service, Development, Auditors, Application Design Considerations, Deployment Pipeline Design Considerations.

UNIT V- ILITIES AND BUSINESS CONSIDERATIONS (10 Periods)

Ilities: Repeatability, Performance, Reliability, Recoverability, Interoperability, Testability, Modifiability

Business Considerations: Business Case, tools of tracking production and aligning with suitable metrics to improve business results, Measurements and Compliance to DevOps Practices, Points of Interaction between Dev and Ops.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Len Bass, Ingo Weber and Liming Zhu, "*DevOps: A Software Architect's Perspective,"* Pearson Education, 2016.

REFERENCE BOOKS:

1. Julian Fish "The Practical Guide to Enterprise DevOps and Continuous Delivery"Micro Focus,2017
2. Gene Kim, Jez Humble, Patrick Debois, and John Willis, " The Devops HandBook, " IT Revolution Press, LLC, 1st Edition, ISBN: 978-1942788003, 2016.

ADDITIONAL LEARNING RESOURCES:

1. https://www.edx.org/course/devops-for-developers-how-to-get-started
2. http://www.cryptextechnologies.com
3. https://github.com/nkatre/Free-DevOps-Books-1/blob

MCA III-SEMESTER
(20MC30107) PROGRAMMING WITH ANGULARJS
(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Java Script; Angularjs concepts; Directives and Expressions; Filters; Modules; Forms; services; Server Communication; Views; AngularJS Animation; Deployment Considerations.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

- **CO1.** Demonstrate knowledge on JavaScript, AngularJS and AngularJS Components.
- **CO2.** Design and Develop Single Page Applications (SPA) by analyzing AngularJS and JavaScript
- **CO3.** Analyze Declarative vs. Procedural Programming, Model View Controller, Filters, Modules to design and Implement AngularJS Single Page Societal Applications.
- **CO4.** Implement AngularJS applications by analyzing controllers and directives.
- **CO5.** Apply CSS Animation, Transforms and Transitions to add animation in AngularJS applications.

DETAILED SYLLABUS:

UNIT I- OVERVIEW OF JAVASCRIPT AND BASICS OF ANGULARJS (11 Periods)

JavaScript: Inclusion of Scripts on a Page, Statements, Functions, Parameters and Return Values, Types and Variables, Primitive Types, JavaScript Operators, Working with Objects, Control Flow, Working with Arrays, Callbacks, and JSON.

AngularJS: Framework, Declarative vs. Procedural Programming, Directives and Expressions, Model View Controller (MVC).

UNIT II- FILTERS, MODULES AND DIRECTIVES (11 Periods)

Filters: Filter, Built-in Filters- Number Filter, Date Filter, limitTo Filter.

Modules: Module, Bootstrapping AngularJS, Creating a Custom Filter

Directives: Directives, Usage of Directives, Built-in Directives, Event-Handling Directives, Using the API Documentation, Creating a Custom Directive, AngularJS Data Binding an AngularJS Controllers.

UNIT III- WORKING WITH FORMS AND SERVICES (11 Periods)

Forms: HTML Forms, AngularJS Forms, Validating Forms.

Services: Services, Use of Services and Creating Services

UNIT IV- SERVER COMMUNICATION AND VIEWS (11 Periods)

Server Communication: Server Communication, Handling Returned Data, Handling Errors.

Views: Installing the ngRoute Module, Usage of URL Routes, Defining Routes, Route Parameters, Eager vs. Conservative Routes, Route Configuration Options and HTML5 Mode.

UNIT V- ANGULARJS ANIMATION AND DEPLOYMENT CONSIDERATIONS (11 Periods)

AngularJS Animation: CSS Animation, Transforms, Transitions and Applying Animations.

Deployment Considerations: Configuration, Testing, Error Handling, Hide Unprocessed Templates, Minification and Bundling, Managing the Build Process and Deployment.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOK:

1. Andrew Grant, "*Beginning AngularJS,* " Apress, 1st Edition, 2015.

REFERENCE BOOKS

1. Brad Dayley, "*Node.js, MongoDB, and AngularJS Web Development,*" 2nd Edition, 2018.
2. Agus Kurniawan, "*AngularJS Programming by Example,*" 1st Edition, 2014.

ADDITIONAL LEARNING RESOURCES:

1. https://www.w3schools.com/angular/
2. https://www.tutorialspoint.com/angularjs/index.htm

MCA III- SEMESTER
(20MC30109) COMPUTER ORIENTED OPTIMIZATION TECHNIQUES
(Professional Elective-IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:--

COURSE DESCRIPTION:
Optimization techniques on Linear Programming Models; Transportation problem; Assignment problem; Network Techniques; Game theory; Inventory models and PERT/CPM in project management.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate the concepts of Optimization Techniques, Network Techniques, PERT/CPM, Rules of drawing Network diagrams to optimize the resources**.**

CO2. Formulate and solve Linear Programming Problems (LPP) using graphical method, simplex method, Duality, Dual Problem and Application of Duality for optimization.

CO3. Apply the optimization techniques to solve Transportation problem, Hungarian method, Branch-Bound Technique for Assignment Problems.

CO4. Analyze and solve Inventory models, Network models and PERT/CPM to find shortest path and decision making in project management.

CO5. Apply Principle of Dominance, Graphical solutions and general solutions for the games to find optimal strategies .

DETAILED SYLLABUS:

UNIT I–LINEAR PROGRAMMING MODEL (10 Periods)

Linear Programming: Concept of Linear Programming Model, Development of Linear Programming Model, Graphical Method, Simplex method, Duality, Formulation of Dual Problem, Application of Duality.

UNIT II - TRANSPORTATION AND ASSIGNMENT PROBLEM (11 Periods)

Transportation Problem: Mathematical Model for Transportation Problem, Types of Transportation problem, Finding an initial basic feasible solution using North-West Corner Rule, Least Cost Entry Method, Vogel's Approximation Method, Optimality solution by U-V method.

Assignment Problem: Formulation of Assignment problem- Hungarian method of Assignment Problem, Branch-Bound Technique for Assignment Problem.

UNIT III-NETWORK TECHNIQUES (12 Periods)

Shortest-Path Model, Systematic Method- Dijkstra's Algorithm, Floyid's Algorithm, Minimum Spanning Tree Problem, Prim Algorithm, Kruskal's Algorithm, Maximal Flow Problem, Linear Programming Modeling for Maximal Flow Problem.

UNIT IV - GAMES AND STRAEGIES (09 Periods)

Two-Person Zero-Sum Games, Maximin-Minimax Principle, Games with and without Saddle Points – Mixed Strategies, Graphic solution of 2xn and mx2Games, Dominance Property, Arithmetic Model for nxn Games, General solution for mxn Rectangular Games.

UNIT V - INVENTORY MODELS AND PROJECT MANAGEMENT BY PERT/CPM (13 Periods)

Inventory Models: Introduction of Inventory – Reasons for maintaining Inventory, Types of inventory costs, Deterministic Inventory Models: EOQ Models with and without shortages-Purchasing and Manufacturing Models with and without shortages.

Project Management by PERT/CPM: Basic steps in PERT/CPM technique, rules of drawing network diagrams, Fulkerson's rule: Critical Path Method (CPM), Program Evaluation and Review Technique (PERT).

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Panneerselvam., "*Operations Research*" 2nd Edition, Prentice-Hall of India.
2. S. Kalavathy, "*Operations Research*," Vikas Publishing House Pvt. Ltd, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Prem Kumar Gupta and D.S. HIRA, "*Operations Research*," S.Chand and Company Ltd., 2008.
2. P.K. Gupta and Man Mohan, "*Problems in Operations Research*," Sultan Chand and Sons,2007.
3. S.D. Sharma, "*Operations Research*," KedarNath Ram Nath and Company, 15thEdition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. https://cbom.atozmath.com/CBOM/Simplex.aspx?q=sm
2. https://cbom.atozmath.com/CBOM/Simplex.aspx?q=gm
3. https://cbom.atozmath.com/CBOM/PertCPM.aspx
4. https://www.zoho.com/in/inventory/economic-order-quantity/
5. https://cbom.atozmath.com/CBOM/Assignment.aspx?q=hm
6. https://cbom.atozmath.com/CBOM/Assignment.aspx?q=hm

MCA III-SEMESTER
(20MC30110) FULL STACK DEVELOPMENT
(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Overview of HTML and CSS; Overview of JavaScript; ReactJS; Redux and Redux Saga; Immutable.js; NodeJS; NodeJS with ExpressJS; SQL and NoSQL Concepts; MongoDB with ReactJS, MongoDB with NodeJS;

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

- **CO1.** Demonstrate knowledge on HTML5, CSS to design look and feel of the web applications.
- **CO2.** Design and build the web applications using JavaScript Programming.
- **CO3.** Apply ReactJS Framework to design and develop user Interfaces and rapid front-end web applications for society as well as Enterprise.
- **CO4.** Analyze NodeJS tool Utilities and modules to implement back-end applications.
- **CO5.** Apply MongoDB to design and organize the database for development of Web Applications.

DETAILED SYLLABUS:

UNIT I- OVERVIEW OF HTML AND CSS (11 Periods)

HTML5: Introduction to HTML5, Browsers and HTML5, Editor's Offline and Online, Tags, Attribute and Elements, Doctype Element, Comments, Headings, Paragraphs, and Formatting Text, Lists and Links, Images and Tables

CSS: Introduction CSS, Applying CSS to HTML5, Selectors, Properties and Values, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties, CSS General Topics

UNIT II- OVERVIEW OF JAVASCRIPT (11 Periods)

JAVASCRIPT: Introduction to JavaScript, Applying JavaScript (internal and external), Understanding JS Syntax, Introduction to Document and Window Object, Variables and Operators, Data Types and Num Type Conversion, Math and String Manipulation, Objects and Arrays, Date and Time, Conditional Statements, Switch Case, Looping in JS and Functions.

UNIT III- REACTJS (11 Periods)

Introduction, Templating using JSX, Components, State and Props, Lifecycle of Components, Rendering List and Portals, Error Handling, Routers, Redux and Redux Saga, Immutable.js, Service Side Rendering, Unit Testing, Webpack.

UNIT IV- NodeJS (11 Periods)

NodeJS: NodeJS Overview, NodeJS - Basics and Setup, NodeJS Console, NodeJS Command Utilities, NodeJS Modules, NodeJS Concepts, NodeJS Events, NodeJS with ExpressJS, NodeJS Database Access.

UNIT V- MongoDB (11 Periods)

MongoDB: SQL and NoSQL Concepts Create and Manage MongoDB, Migration of Data into MongoDB, MongoDB with ReactJS, MongoDB with NodeJS, Services Offered by MongoDB.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Vasan Subramanian, *"Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node,"* Apress, 2nd Edition, 2019.
2. Kogent Learning Solutions Inc., "*Web Technologies Black Book,"* Dreamtech Press, 2011.

REFERENCE BOOKS:

1. Brad Dayley, "*Node.js, MongoDB, and AngularJS Web Development,"* Second Edition, 2018.
2. Uttam K Roy, "*Web Technologies*," Oxford University Press, 2010.

ADDITIONAL LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/what-is-full-stack-development/
2. https://reactjs.org/docs/create-a-new-react-app.html
3. https://www.geeksforgeeks.org/how-to-connect-nodejs-with-reactjs/

MCA III-SEMESTER

(20MC30112) PROGRAMMING IN RUBY

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on "Object Oriented Programming" and "Database Management Systems"

COURSE DESCRIPTION:

Ruby Basics; Datatypes; Conditional statements; Loops; strings; expressions; Arrays, Hashes; Exception Handling; Working with files; objects and classes, modules and mixins; Rails;MVC; Creating Rails Applications.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Demonstrate the knowledge on concepts of Ruby Programming, Data types, Arrays, Hashes, Classes, Functions and Ruby on Rails to solve problems.

CO2. Analyse and adapt Object oriented features, strings, modules, methods and files to design front-end and back-end applications.

CO3. Apply TexMate, Vi Emacs editors, Netbeans, Aptana Studio, Rad Rails IDE's and Ruby on Rails framework to develop web applications.

CO4. Analyze the classes, methods, inheritance, hashes, files to develop solutions for societal problems**.**

CO5. Implement library information system adapting Ruby on Rails, MVC Architecture and incremental development.

DETAILED SYLLABUS:

UNIT I – CONCEPTS OF RUBY (11 Periods)

Ruby: Hello Matz, Installing ruby, Ruby is object oriented, reserved words, Variables, strings and regular expressions, numbers and operators, Methods, blocks, Ruby Data types: Interactive ruby(IRB), Ruby interactive(RI),Essential data types, Identifiers and data types, working with numbers, Boolean, strings, symbols, regular expressions, ranges

UNIT II – CONDITIONS, CONTROL AND STRINGS (10 Periods)

Conditional Love – The if Statement, using else and elsif, The case Statement, The while Loop,Loop method, The for loop,Execution before and after a program. Strings – Creating Strings, delimited strings,here document, Concatenating, Accessing, Comparing and

Manipulating Strings, Case Conversion, Managing Whitespace, Incrementing and Converting Strings, Regular Expressions.

UNIT III – FUNCTIONS, ARRAYS AND HASHES (11 Periods)

Math – Class Hierarchy and Included Modules, Converting Numbers, Basic Math Operations, inquiring about numbers, math methods and functions, rational numbers,Arrays – Creating Arrays, accessing elements,Concatenation, Set Operations, Comparing Arrays,Changing Elements, Deleting Elements, arrays and blocks,Multidimensional Arrays,Hashes – Creating, Accessing,Iterating and Changing Hashes. Converting hashes to other classes

UNIT IV – WORKING WITH FILES AND CLASSES (10 periods)

Working with files-directories, creating a new file,opening an existing file,deleting and renaming files,file inquiries, changing file mode and owner,IO class, Classes – Defining the Class,Instance Variables, Accessors, Class Variables, Class Methods, Inheritance, Modules, public, private or protected,monkey patching,singleton methods and eigen classes, modules and mixins.

Case Study: create a Ruby Class called Customer and declare two methods display_details – to display the details of the customer. total_no_of_customers – to display the total number of customers created

Unit V – RAILS ON RUBY (13 periods)

Getting Started with Rails: What Is Rails? A Brief History of Rails,Installing rails, Editors & Ide's, writing and executing simple rail programs,Understanding Rails,A Working Sample: Creating a New Rails Application,Scaffolding and Migrations,Analyzing the model, controller and view layer, Adding partials, validations and style,Incremental Development, Logging and Debugging: Adding pagination, Adding comments, defining assotiations, Logging & debugging.

Case Study: Develop a Library Information System to give access to different users to add, update and view books.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Michael Fitzgerald, *"Learning Ruby,"* O'Reilly Publications, 2007.
2. Antonio Cangiano, *"Ruby on Rails for Microsoft Developers,"* Wiley India Edition,2009

REFERENCE BOOKS:

1. Ruby for Beginners: Your Guide to Easily Learn Ruby Programming in 7 Days by iCode Academy
2. Head First Ruby by Jay Mc Garven
3. Into to Ruby Programming: Beginners Guide by John Elder

ADDITIONAL LEARNING RESOURCES:

1. https://www.ruby-lang.org/en/documentation
2. https://ruby-doc.com/docs/ProgrammingRuby/

MCA III - SEMESTER
(20MC30113) USER INTERFACE DESIGN
(Professional Elective - IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on "Software Engineering"

COURSE DESCRIPTION:

Graphical user interface; Design process; Screen Designing; Windows; Components; Software Tools; Interactive Devices.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate the concepts of principles, Characteristics, business functions, tools and devices of User Interface design.

CO2. Identify and analyse the user requirements, Windows Menus and Navigation Schemes, Multimedia components, technological and characteristics of graphical and web user interfaces for quality interface design.

CO3. Design appropriate user interface models for desktop and web applications.

CO4. Apply user interface software mockup tools, input, output and pointing devices to design user interfaces.

CO5. Adhere to ethics and adapt guidelines and standards for the design of user interface design.

DETAILED SYLLABUS:

UNIT I- USER INTERFACE, CHARACTERISTICS OF GRAPHICAL AND WEB USER INTERFACES (11 Periods)

User Interface: Importance of good design, Benefits of good design, Screen design.

Characteristics of Graphical and Web User Interfaces: The graphical user interface - popularity of graphics, direct manipulation, Graphical systems, Characteristics; Web user Interface - Popularity, Characteristics; Principles of user interface design.

UNIT II- CONTROL DESIGN PROCESS (10 Periods)

Human interaction with computers, Importance of human characteristics, human considerations in design, Human interaction speeds, and understanding business functions.

UNIT III- SCREEN DESIGN (12 Periods)

Screen meaning and purpose, Organizing screen elements, Ordering of screen data and content, Screen navigation and flow, Visually pleasing composition, Amount of information, Focus and emphasis, Presenting information simply and meaningfully, Information retrieval on web, Statistical graphics, Technological considerations in interface design.

UNIT IV- WINDOWS AND MULTIMEDIA (11 Periods)

Windows: Selection of window, Selection of device based and screen based controls.

Multimedia: text and messages, Icons and images, Multimedia, Color uses, Problems with colors, choosing colors. Standards and user interface guide lines.

UNIT V- SOFTWARE TOOLS AND DEVICES (11 Periods)

Specification methods, Interface building tools, Interaction devices - Keyboards and keypads, Pointing devices, Speech and auditory interfaces; Image and video displays, drivers.

Total Periods: 55

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Wilbert O. Galitz, *"The Essential Guide to User Interface Design,"* Wiley India Education, 2nd Edition, 2008.
2. Ben Schneiderman and Catherine Plaisant, *"Designing the User Interface,"* Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. A Dix, Janet Finlay, G. D. Abowd and R. Beale, *"Human□Computer Interaction,"* Pearson Publishers, 3rd Edition, 2008.
2. Jonathan Wolpaw and Elizabeth Winter Wolpaw, *"Brain□Computer Interfaces: Principles and Practice,"* Oxford Publishers, 1st Edition, 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.javatpoint.com/user-interface-design
2. https://www.tutorialspoint.com/human_computer_interface/index.htm
3. https://www.w3computing.com/systemsanalysis/human-computer-interaction-intro/
4. https://www.interaction-design.org/literature/article

MCA III-Semester
(20MC30132) **WEB PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PREREQUISITES: A Course on Web Programming.

COURSE DESCRIPTION:

Concepts of HTML5; Java Script; Developing Web Applications using Servlet, JSP and PHP; Adopting Tomcat Server and XAMP Server for deploying Web Applications.

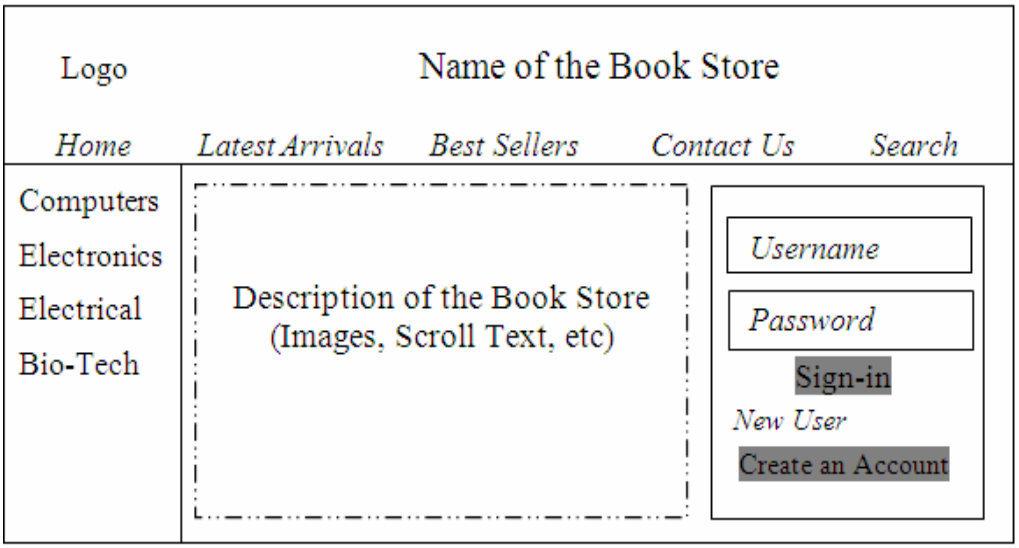
COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

- **CO1.** Demonstrate knowledge on HTML5, Java Script, AJAX programming.
- **CO2.** Design and develop web Applications using HTML5, JavaScript, Servlet, JSP and PHP.
- **CO3.** Apply JSP and PHP technologies to implement Societal E-Commerce applications to infer potential insights.
- **CO4.** Analyze 2-tier, 3-tier and MVC architectures, Servlets Life cycle and JSP Life cycle, Directory structure of servlets and JSP to design web application.
- **CO5.** Analyze and Solve real time problems using Server-side technologies, Tomcat Server and XAMPP Server for deployment of web applications.
- **CO6.** Adhere to ethics and adapt JSP Standard Tag Libraries, PHP Standard Recommendations (PSR) to develop web application.
- **CO7.** Work independently or in teams to solve problems with effective communication.

LIST OF EXERCISES:

1. Design the following static web pages of an online book store web application.



a. Home Page:

b. Catalogue Page: The catalogue page should display the following details of available books.

i. Snap shot of cover page
ii. Title of the text book
iii. Author name
iv. Publisher
v. Price
vi. More details link.

c. Registration Page: Design the Registration page with the following fields and navigates it with creates an account link.

First Name, Last Name, Gender, Date of Birth, Username, Password, Confirm Password, Address, Postal Code, Mobile No., Email-Id.

2.

a) Design a web page to store username and password information using the local storage concept.
b) Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a client's machine using a real SQL database.

3. Apply the following styles to all web pages of online book store web application.

a. Fonts and Styles: font-family, font-style, font-weight and font-size
b. Backgrounds and colors: color, background-color, background-image and background-repeat.
c. Text: text-decoration, text-transformation, text-align and text-

indentation, text-align

d. Borders: border, border-width, border-color and border- style
e. Styles for links: A: link, A: visited, A:active, A:hover
f. Selectors, Classes, Layers and Positioning elements.

4. Write a JavaScript code to validate the following fields of the Registration web page.
   a. First Name/Last Name - should contain only alphabets and the length should not be less than 8 characters.
   b. Username - It should contain combination of alphabets, numbers and underscore. It should not allow spaces and special symbols.
   c. Password - It should not less than 8 characters in length and it contains one uppercase letter and one special symbol.
   d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date is invalid. Ex. 29 Feb. 2009 is an invalid date.
   e. Postal Code: It must allow only 6 digit valid number.
   f. Mobile No. - It should allow only numbers and total number of digits should be equal to 10.
   g. e-mail id - It should allow the mail id with the following format: Ex. mailid@domainname.com

5. Write a basic Servlet program that must display information like
   a. Request method used by the client and
   b. Current system date

6. Write a JSP program for finding total number of visitors in a site to keep track of active users at a given instance of time, and also display the user session starting time.

7. Write a JSP program that creates a cookie on username which is send from html file and display the cookie value as a response. The cookie must be active based on the maximum active interval time.
8. Write a PHP program to demonstrate call by value and call by reference techniques.

9. Write a PHP code to read the username and password entered in the Login form of the online book store and authenticate with the values available in cookies. If user enters a valid username and password, welcome the user by username otherwise display a message stating that, entered details are invalid.

10. Write a PHP code to implement CRUD (**C**reate, **R**ead, **U**pdate and **D**elete) operations.
11. Write a PHP code for storing books details like Name of the book, author, publisher, Edition, price, etc into MySQL database. Embed a PHP code in catalogue page of the online book store to extract books details from the database.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book",* Dreamtech Press, 2011.
2. Steven Holzner, *"The Complete Reference PHP"*, Tata McGraw-Hill Education Pvt. Ltd., 2007.

Software / Tools used:

Notepad++, XAMPP, Eclipse IDE, Geany /sublime text shell IDE, java

MCA III-SEMESTER

(20MC3AC01) SERVER SIDE DEVELOPMENT WITH NODEJS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	-	2	-

PRE-REQUISITES:

Course on "Object oriented Programming through JAVA".

COURSE DESCRIPTION:

Introduction to Node.js; Modules; HTTP Module; File System Module; URL Module; NPM; Events; Upload Files; Send an Email; MongoDB introduction; Create a Database.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1. Demonstrate Components and IDE o NodeJS and MongoDB.
CO2. Implement web applications and APIs using the Node.js.
CO3. Apply Node.js and MongoDB to design database and develop web applications.
CO4. Design and develop web applications using Node.js.
CO5. Analyze core modules in Node.js and used in building of HTTP server Applications.
CO6. Work independently or in teams to solve problems with effective communication.

LIST OF EXERCISES:

1. Node.js - Environment Setup-How to install Node.js on Windows
2. Implement *Hello World application* in Node.js.
3. Develop Node.js application to split the query string into readable parts, such as the URL.
4. Implement Node.js file system module allows you to work with the file system on your computer.(Read files, Create files, Update files, Delete files and Rename files)
5. Installing NPM (Node Package Manager) on Windows
6. Create a Node.js file that will convert the output "Hello World!" into upper-case letters.
7. Create a function that will be executed when a "scream" event is fired using event handlers in Node.js
8. Develop Node.js web page that lets the user upload files to your computer.
9. Node.js can be used in database applications, one of the most popular NoSQL database is MongoDB. Installation of MongoDB Driver.

10. To create a database in MongoDB, start by creating a MongoClient object, and then specify a connection URL with the correct ip address and the name of the database you want to create.

REFERENCE BOOKS:

1. Simon Holmes, *"Getting MEAN with Mongo, Express, Angular, and Node,"* Manning Publications; 1st Edition, 2015.
2. Azat Mardan, *"Practical Node.js: Building Real-World Scalable Web Apps,"* APRESS; 2nd Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. https://www.w3schools.com/nodejs/default.asp