Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

For

Master of Computer Application

Semester-III

(Effective from the session: 2022-23)
Department of Computer Science & Engineering

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH

FACULTY OF Engineering

Department of Computer Science & Engineering

MCA -3rd Semester

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	SMC04301	Information Theory & Coding	3	1	-	4	30	70	100	3 Hrs.
2	SMC04302	Full Stack Web Development	3	1	-	4	30	70	100	3 Hrs
3	SMC04303	Theory of computation	3	1	-	4	30	70	100	3 Hrs
4	SMC04304	Advanced Software Testing	3	1	-	4	30	70	100	3 Hrs.
5	SMC04351	**Elective –II**	3	1	-	4	30	70	100	3 Hrs.
6	SMC04352	**Elective -III**	3	1	-	4	30	70	100	3 Hrs.
7	SMC04391	Web Development Lab	-	-	2	1	15	35	50	3 Hrs.
8	SMC04392	Software Testing Lab	-	-	2	1	15	35	50	3 Hrs.
9	SMC04393	**Elective- III Lab**	-	-	2	1	15	35	50	3 Hrs.
Total Contact hr. per week: 30			**Total Credit**			**27**	**150**	**350**	**750**	

Table – II		
Elective - II		
Sr. No	Course Code	Course Title
1	SMC04351A	Virtualization and Cloud Computing
2	SMC04351B	Information Retrieval System
3	SMC04351C	Artificial Neural Network

Table – III		
Elective - III		
Sr. No	Course Code	Course Title
1	SMC04352A	Machine Learning
2	SMC04352B	Automation and Configuration Management
3	SMC04352C	UI/UX Fundamentals

Course File	**Information Theory & Coding**				
Course Code	SMC04301				
Semester	**3rd**				
Course Credit	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Nill				
Course Objectives	1. Understand error–control coding. 2. Understand encoding and decoding of digital data streams. 3. Be familiar with the methods for the generation of these codes and their decoding techniques. 4. Be aware of compression and decompression techniques. 5. Learn the concepts of multimedia communication.				
Course Contents	**Unit- I Coding for Reliable Digital Transmission and storage**: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies, Huffman coding. **Unit- II Linear Block Codes:**Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system. **Unit-III Cyclic Codes:** Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes. **Unit- IV Encoding of Convolutional Codes**- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority-logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system. **Unit- V** Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome Computation and iterative algorithm, Error Location polynomials for single				

	and double error correction.
Course Outcomes	1. Learn measurement of information and errors. 2. Obtain knowledge in designing various source codes and channel codes 3. Design encoders and decoders for block and cyclic codes 4. Understand the significance of codes in various applications
Text Books	1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc 2014. 2. Error Correcting Coding Theory-Man Young Rhee, McGraw – Hill Publishing 1989.
Reference Books	1. Digital Communications- John G. Proakis, 5th ed., , TMH 2008. 2. Introduction to Error Control Codes-Salvatore Gravano-oxford. 3. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India. 4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

Course Title	**Full Stack Web Development**				
Course Code	**SMC04302**				
Semester	**3rd**				
Course Credit	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Must know basic idea about website and its working.				
Course Objectives	Students completing this course will learn to: • Understand the connections between MVC architecture and full-stack web development • Leverage an object-relational mapper (ORM) for data-driven application design and database-neutral implementation • Become conversant with documentation and release notes in order to properly implement and stay current with ongoing development to a full-stack web framework. • Evaluate the design and architecture of a web or mobile system, including issues such as design patterns (including MVC), layers, tradeoffs between redundancy and scalability, state management, and search engine optimization				
	UNIT 1: HTML Introduction to HTML,Browsers and HTML, Editor's Offline and Online, Tags,Attribute and Elements, Doctype Element, Comments, Headings, Paragraphs, and Formatting Text, Lists and Links, Images and Tables **UNIT 2: CSS** Introduction CSS, Applying CSS to HTML, 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 3: 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, Functions
	UNIT 4: Python
	Python Installation & Configuration, developing a Python Application, Connect MongoDB with Python
	UNIT 5: MongoDB
	SQL and NoSql Concepts, Create and manage MongoDB ,Migration of Data into MongoDB, MongoDB with PHP, MongoDB with NodeJS,Services Offered by MongoDB
Course Outcomes	At the conclusion of this course, successful students will be able to: • Analyze specific computing problems of information storage and dissemination, and articulate their requirements and appropriate solution in object-oriented languages • Design, implement, and evaluate a Ruby on Rails web application that meets specific, desired user needs • Understand and articulate how full-stack frameworks adhere, or fail to adhere, to open standards for networking and the web • Read and interpret documentation and release notes for languages, libraries, and frameworks, and adjust professional practice based on the contents of that material • Describe how authentication, secure certificates, and secure communication can be used in web sessions.
Text Books	• Agile Development with Rails 7. Ruby, S. with D. Thomas, 2022. • The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer.
Reference Books	• ASP.NET Core 3 and Angular 9: Full-stack web development with .NET Core 3.1 and Angular 9.

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH

FACULTY OF Engineering

Department of Computer Science & Engineering

MCA -3rd Semester

Course Title	Theory of Computation				
Course Code	SMC04303				
Semester	3rd				
Course Credit	L	T	P	T C	
	3	1	-	4	
Prerequisites	Basic knowledge about computer science study.				
Course Objectives	• Students will learn about a variety of issues in the mathematical development of computer science theory, particularly • finite representations for languages and machines. Students will gain a more formal understanding of algorithms and procedures.				
Course Contents	**UNIT I** **THE THEORY OF AUTOMATA: Introduction** to automata theory, Examples of automata machine, Finiteautomata as a language acceptor and translator. Deterministic finite automata. Non deterministic finite automata,finite automata with output (Mealy Machine. Moore machine). Finite automata with ? moves, Conversion ofNFA to DFA by Arden's method, Minimizing number of states of a DFA. My hill Nerode theorem, Propertiesand limitation of FSM. Two way finite automata. Application of finite automata. **UNIT II** **REGULAR EXPRESSIONS :** Regular expression, Properties of Regular Expression. Finite automata andRegular expressions. Regular Expression to DFA conversion & vice versa. Pumping lemma for regular sets.Application of pumping lemma, Regular sets and Regular grammar. Closure properties of regular sets. Decisionalgorithm for regular sets and regular grammar.				

UNIT III

GRAMMARS:

Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types ofgrammars. Role and application areas of grammars. Context free grammar. Left most linear & right mostderivation trees. Ambiguity in grammar. Simplification of context free grammar. Chomsky normal from.Greibach normal form, properties of context free language. Pumping lemma from context free language.Decision algorithm for context tree language.

UNIT IV

PUSH DOWN AUTOMATA AND TURING MACHINE: Basic definitions. Deterministic push downautomata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language. Turing machine model. Representation of Turing Machine Construction ofTuring Machine for simple problem's. Universal Turing machine and other modifications. Church's Hypothesis.ost correspondence problem. Halting problem of Turing Machine.

UNIT V

COMPUTABILITY: Introduction and Basic concepts. Recursive function. Partial recursive function. Partialrecursive function. Initial functions, computability, A Turing model for computation. Turing computablefunctions, Construction of Turing machine for computation. Space and time complexity. Recursive enumerablelanguage and sets.

Course Outcomes	At the end of this course students will: • Be able to construct finite state machines and the equivalent regular expressions. • Be able to prove the equivalence of languages described by finite state machines and regular expressions. • Be able to construct pushdown automata and the equivalent context free

	grammars.
	• Be able to prove the equivalence of languages described by pushdown automata and context free grammars.
	Be able to construct Turing machines and Post machines.
Text Books	1. Theory of Computer Science (Automata Language & Computation), K.L.P. Mishra and N. Chandrasekran, PHI.
	Introduction to Automata theory. Language and Computation, John E. Hopcropt& Jeffery D. Ullman, NarosaPublishing House.
Reference Books	1. Finite Automata and Formal Languages: A Simple Approach, A.M. Padma Reddy, Pearson Education, India.
	2. Theory of Automata and Formal Language, R.B. Patel & P. Nath, Umesh Publication.
	3. An Introduction and finite automata theory, Adesh K. Pandey, TMH.
	Theory of Computation, AM Natrajan. Tamilarasi, Bilasubramani, New Age International Publishers.

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH

FACULTY OF Engineering

Department of Computer Science & Engineering

MCA -3rd Semester

Course Title	Advanced Software Testing				
Course Code	SMC04304				
Semester	3rd				
Course Credit	L	T	P	TC	
	3	1	-	4	
Prerequisites	Basic knowledge of Software Engineering				
Course Objectives	1. To learn the criteria for test cases. 2. To learn the design of test cases. 3. To understand test management and test automation techniques. 4. To apply test metrics and measurements.				
Course Contents	**Unit-1 Introduction:** Testing as an Engineering Activity, Testing a s a Process, Testing Maturity Model, Testing axioms – Basic definition s, Software Testing Principles, The Testers Role in a Software Development Organization, Origins of Defects, Cost of defects, Defect Classes, The Defect Repository and Test Design, Defect Examples - Dev eloper /Tester Support of Dev eloping a Defect Repository . **Unit-2 Test Case Design Strategies:** Introduction to Test case Design Strategies, Using Black Box Approach to Test Case Design, Boundary Value Analysis , Equivalence Class Partitioning , State based testing, Cause-effect graphing , Compatibility testing , user documentation testing , domain testing , Random Testing , Requirements based testing . Using White Box Approach to Test design, Test Adequacy Criteria, static testing v s. structural testing , code functional testing, Additional White box testing approaches, Evaluating Test Adequacy Criteria. **Unit-3 Levels Of Testing:** The need for Levels of Testing , Unit Test – Unit Test Planning , Designing the Unit Tests, The Test Harness, Running the Unit tests and Recording results, Integration tests – Designing Integration Tests, Integration Test Planning, Scenario testing, Defect bash elimination Sy stem Testing,				

	Acceptance testing, Performance testing, Regression Testing, Internationalization testing, Ad-hoc testing – Alpha, Beta Tests, Testing OO systems, Usability and Accessibility testing, Configuration testing, Compatibility testing, Testing the documentation, Website testing.
	Unit-4 Test Management and Automation: People and organizational issues in testing , Organization structures for testing teams , testing serv ices , Test Planning – Test Plan Components, Test Plan Attachments, Locating Test Items, test management, test process , Reporting Test Results, Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group.
	Unit-5 Automated Tools for Testing: Load Runner, configuring a scenario & host, Managing scenarios using test director, Runtime and transaction online
Course Outcomes	After completing this module students will know about 1. The criteria for test cases. 2. The design of test cases. 3. Test management and test automation techniques. 4. Test metrics and measurements.
Text Books	1. Srinivasan Desikan and Gopala swamy Ramesh, ―Software Testing – Principles and Practices, Pearson Education. 2. Ron Patton, ―Software Testing, Second Edition, Sams Publishing, Pearson Education. AU Library .com
Reference Books	1. Ilene Burnstein, ―Practical Software Testing ‖, Springer International Edition. 2. Edward Kit Software Testing in the Real World – Improving the Process, Pearson Education. 3. Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York. 4. Aditya P. Mathur, ―Foundations of Software Testing _ Fundamental Algorithms and Techniques, Dorling Kinder sley (India) Pv t. Ltd., Pearson Education.

Course Title	Elective –II Virtualization and Cloud Computing				
Course Code	**SMC04351A**				
Semester	**3rd**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Basic knowledge of Computer Network.				
Course Objectives	- To understand Cloud Computing concepts, technologies, architecture and applications - To understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization - To understand different cloud programming platforms and tools to develop and deploy applications on cloud				
Course Contents	**Unit - I Introduction -** Overview of Computing Paradigms: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Cloud Computing (NIST Model) Properties and Characteristics of Cloud. Cloud Computing Architecture - Cloud computing stack Service Models (XaaS): Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service(SaaS) Deployment Models: Public cloud, Private cloud, Hybrid cloud. Data Center Architecture. **Unit - II Cloud Resource Virtualization -** Introduction to virtualization Different approaches to virtualization Hypervisors Machine Image Virtual Machine(VM) Process VM vs System VM Resource Virtualization: Server, Storage, Network Full Virtualization vs Para Virtualization Operating System Support for Virtualization Virtual Machine(resource) Provisioning and Manageability VM Placement, VM Migration. **Unit - III Service Management in Cloud Computing -** Service Level Agreements(SLAs) Billing & Accounting Economics of scaling Managing Data: Database & Data Stores in Cloud, Large Scale Data Processing. **Unit - IV Task Scheduling in Cloud -** Scheduling Algorithms for Computing Clouds Fair Queuing Start Time Fair Queuing Borrowed Virtual Time Cloud Scheduling Subject to Deadlines Scheduling MapReduce Applications Subject to Deadlines.				

	Unit - V Cloud Security - Cloud Security Risks, Trust, Operating System Security, VM Security, Security of Virtualization, Security Risks Posted by Shared Images, Security Risks Posted by Management OS, Data privacy and security Issues, Identity & Access Management, Access Control, Authentication in cloud computing,Case Study - Microsoft Azure, Amazon EC2
Course Outcomes	Upon successful completion of this course students should be able to: • Develop and deploy cloud application using popular cloud platforms • Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud. Make recommendations on cloud computing solutions for an enterprise.
Text Books	1. Dan C Marinescu, Cloud Computing, Theory and Practice, MK Elsevier 2.RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley
Reference Books	1. Barrie Sosinsky, Cloud Computing Bible, Wiley 2. Jim Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, MK Elsevier

Course Title	Elective – II Information Retrieval System			
Course Code	SMC04351B			
Semester	3rd			
Course Credit	L	T	P	T C
	3	1	-	4
Prerequisites	Nill			
Course Objectives	1. To understand the basics of information retrieval with pertinence to modeling, query operation s and indexing. 2. To get an understanding of machine learning techniques for text classification and clustering. 3. To understand the various applications of information retrieval giving emphasis to multimedia IR, web search. 4. To understand the concepts of digital libraries.			
Course Contents	**Unit-1 Introduction:** Motivation: Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open-Source IR Sy stems–History of Web Search – Web Characteristics– The impact of the web on IR —IR Versus Web Search–Components of a Search engine. **Unit-2 Modeling:** Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing. **Unit-3 Indexing & Classification:** Text Classification and Naïve Bay es – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents.			

	Unit-4 Search of Web: Searching the Web–Structure of the Web–IR and web search–Static and Dynamic Ranking –Web Crawling and Indexing–Link Analysis **Unit-5 XML Retrieval Multimedia IR:** Models and Languages-Indexing and Searching Parallel and Distributed IR-Digital Libraries
Course Outcomes	Students will be able to know information retrieval, query operations and indexing, understanding of machine learning techniques and various applications of information retrieval.
Text Books	1. An Introduction to Information Retrieval: Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge University Press. 2. Speech and Language Processing: Jurafsky Dan and Martin James, Pearson Publication. 3. Natural Language Understanding: Allen James, Pearson Publication.
Reference Books	1. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, " ModernIn formation Retrieval: The concepts and Technology behind Search" (ACM Press Books), Second Edition. 2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, " Information Retrieval Implementing and Evaluating Search Engines", The MIT Press, Cambridge, Massachusetts London, England.

Course Title	Elective – II Artificial Neural Network
Course Code	SMC04351C
Semester	3rd

Course Credit	L	T	P	TC	
	3	1	-	4	

Prerequisites	Artificial Neural Network
Course Objectives	To understand the biological neural network and to model equivalent neuron models. To understand the architecture, learning algorithm and issues of various feed forward• and feedback neural networks.
Course Contents	Unit- I Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process, UNIT - II Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection. UNIT - III Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning. UNIT - IV Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification. UNIT - V Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network

	Paradigm Hopfield Models – Hopfield Models, Computer Experiment.
Course Outcomes	1. Create different neural networks of various architectures both feed forward and feed backward. 2. Perform the training of neural networks using various learning rules. 3. Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.
Text Books	Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.
Reference Books	1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005 2. Neural Networks in Computer Inteligance, Li Min Fu MC GRAW HILL EDUCATION 2003 3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004. 4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

Course Title	Elective – III Machine Learning
Course Code	SMC04352A
Semester	3rd

Course Credit	L	T	P	T C	
	3	1	-	4	

Prerequisites	1. Basic knowledge of Algorithms
Course Objectives	2. To understand the basic concepts of statistical learning methods and models.
	3. To understand the importance of unsupervised learning in multivariate data sets.
	4. To understand the importance of supervised learning in classifying class labels for prediction.
	5. To understand the different algorithms related to classification techniques.
	6. To understand the estimation procedure for multiple Linear regression coefficients.
Course Contents	**Unit I: Introduction to Machine Learning Algorithms**
	Introduction to Machine learning – Statistical Learning – types of Machine Learning – learning models: geometric, probabilistic and logistic models, introduction to supervised, unsupervised and reinforcement learning – model evaluation – model implementation – model accuracy indicators.
	Unit II: Supervised Learning – Simple Linear Regression Analysis
	Introduction to parametric machine learning method, assumptions of parametric machine learning methods, linear model and its assumptions, simple linear regression, scatter diagram, Simple linear Regression parameter estimation, properties of regression parameters, testing the significance of regression parameters using ANOVA and t test, estimation of σ^2, Interval Estimation of the Mean Response, R Square, Adjusted R Square, Normality of response variable, prediction of new observations, Confidence interval for β_0, β_1 and σ^2.
	Unit III: Supervised Learning – Multiple Linear Regression Analysis I
	Multiple linear regression model, assumptions of Multiple linear regression variables –

multi collinearity, homoscedasticity, autocorrelation, effects of multi collinearity, effect of homoscedasticity and auto autocorrelation in parameter estimation, Least - Squares Estimation of the Regression Coefficients, Geometrical Interpretation of Least Squares, Properties of the Least - Squares Estimators, Estimation of σ2, Inadequacy of Scatter Diagrams in Multiple Regression.

Unit IV: Supervised Learning – Multiple Linear Regression Analysis II

testing the general linear hypothesis, Test for Significance of Regression, Tests on Individual Regression Coefficients and Subsets of Coefficients, Special Case of Orthogonal Columns in X, Confidence Intervals on the Regression Coefficients, CI Estimation of the Mean Response, Simultaneous Confidence Intervals on Regression Coefficients, predicting new observations, residual analysis, model adequacy and validation.

Unit V: Supervised Learning – Non Linear Regression Analysis

Introduction to non-linear regression models, non-linear least square method to estimating the regression parameters, transformation of non-linear model to linear model, linearization, other parameter estimation methods, starting values, statistical inference in non-linear regression models.

Course Outcomes	• Understand the different machine learning techniques and its application. • Understand the importance of simple linear regression in predicting new observations. • Understand the importance of assumptions in estimating the parameters in simple linear regression analysis. • Understand the important multiple linear regression in predictive techniques and its assumptions. • Understand the effect of model assumptions in estimating the coefficients in multiple linear regression analysis.
Text Books	1. Introduction to Linear Regression Analysis, Fifth Edition - DOUGLAS C. MONTGOMERY, ELIZABETH A. PECK, G. GEOFFREY VINING, A JOHN WILEY & SONS, INC., PUBLICATION. 2. Introduction to Machine Learning - EthemAlpaydm, The MIT Press

Reference Books	1. Python Machine Learning - Sebastian Raschka, PACKT Publishing
	2. Using Multivariate Statistics - Barbara G. Tabachnick, Linda S. Fidell, Pearson Education Inc.

Course Title	Elective – III Automation and Configuration Management			
Course Code	**SMC04352B**			
Semester	**3rd**			
Course Credit	**L**	**T**	**P**	**T C**
	3	**1**	**-**	**4**
Prerequisites	Nill			
Course Objectives	The Objective of this course is to give a strong foundation of System Provisioning and Configuration Management.			
Course Contents	**UNIT-I INTRODUCTION TO PROVISIONING** Understanding Provisioning - Significance of Provisioning - Test Machines - Provisioning for Deployments **UNIT-II PROVISIONING ON CLOUD** Provisioning machines - Automated provisioning **UNIT-III SYSTEM PROVISIONING AND CONFIGURATION MANAGEMENT** State of various tools in Provisioning and Configuration - Reasons for using provisioning and configuration tools - Examples: Automation, preventing errors, tracking of changes - Examples of tools and their capabilities **UNIT-IV TOPICS FROM TERRAFORM** Fundamentals – Variables, Conditions, Loops – TCL – Statement Management – Workspace – Modules **UNIT-V CAMS (CULTURE, AUTOMATION, MEASUREMENT AND SHARING)** CAMS – Culture - CAMS – Automation - CAMS – Measurement - CAMS – Sharing - Test-Driven Development - Configuration Management - Infrastructure Automation - Root Cause Analysis – Blamelessness - Organizational Learning			
Course Outcomes	On completion of this course, the students will be able to:- • Understand provisioning on Cloud. • Learn automation, preventing errors, tracking of changes. • Understand configuration management.			

Text Books	• Get started with Ansible - by Lorin Hochstein. • Ansible Configuration Management - by Daniel Hall.
Reference Books	• Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001. • Royce, "Software Project Management", Pearson Education, 1999. •Jalote, "Software Project Management in Practice", Pearson Education, 2002.

Course Title	Elective –III UI/UX Fundamentals				
Course Code	**SMC04352C**				
Semester	**3rd**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Nill				
Course Objectives	1. The aim of the UI/UX course is to provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, usability testing methods, interface technologies and user centered design in corporate perspective. 2. The course is organized around a practical project with iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design. 3. The students will be given exposure to wireframing and Prototyping software in the various UI/UX Design tools.				
Course Contents	**UNIT I:** Introduction to the UI L T P/ S SW/F W No. of PSDA TOTAL CREDIT UNITS 0 1 0 2 3 2 What is User Interface Design (UI) -The Relationship Between UI and UX , Roles in UI/UX, A Brief Historical Overview of Interface Design, Interface Conventions, Approaches to Screen Based UI. **UNIT II:** Template vs Content, Formal Elements of Interface Design, Active Elements of Interface Design, Composing the Elements of Interface Design, UI Design Process, Visual Communication design component in Interface Design **UNIT III:** Introduction to UX UX Basics- Foundation of UX design, Good and poor design, Understanding Your Users, Designing the Experience Elements of user Experience, Visual Design Principles, Functional Layout, Interaction design,				

	UNIT IV: Introduction to the Interface, Navigation Design, User Testing, Developing and Releasing Your Design
	UNIT V: UI/ UX Design Tools User Study- Interviews, writing personas: user and device personas, User Context, Building Low Fidelity Wireframe and High-Fidelity Polished Wireframe Using wireframing Tools, Creating the working Prototype using Prototyping tools, Sharing and Exporting Design
Course Outcomes	Students will be able to • Understand iterative user-centered design of graphical user interfaces • Apply the user Interfaces to different devices and requirements, • Create high quality professional documents and artifacts related to the design process.
Text Books	1. A Project Guide to UX Design: For user experience designers in the field or in the making (2nd. ed.). Russ Unger and Carolyn Chandler. New Riders Publishing, USA, 2012. 2. The Elements of User Experience: User-Centered Design for the Web and Beyond, Second Edition Jesse James Garrett, Pearson Education. 2011.
Reference Books	1. The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques, Third Edition Wilbert O. Galitz , Wiley Publishing, 2007. 2. The UX Book Process and Guidelines for Ensuring a Quality User Experience, Rex Hartson and Pardha S. Pyla, Elsevier, 2012

Course Title	Web Development Lab				
Course Code	**SMC04391**				
Semester	**3ʳᵈ**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Nill				
Course Objectives	The course will enable students to • Understand the importance of the web as a medium of communication. • Understand the principles of creating an effective web page, including an in-depth consideration of information architecture. • Develop skills in analyzing the usability of a web site. • Learn the language of the web: HTML and CSS. • Be able to embed social media content into web pages. • Implement and understand how to interpret basic web analytics. • Use JavaScript to access and use web services for dynamic content				
Course Contents	(Any 10) 1. Develop and demonstrate a XHTML file that includes Javascript script for the following problems: a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers b) Input: A number n obtained using prompt Output: A table of numbers from 1 to n and their squares using alert 2. a) Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected. b) Modify the above program to get the current semester also (restricted				

to be a number from 1 to 8)

3. a) Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

4. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include 100 USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

5. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc. b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.

6. a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages. b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

7. Write a Perl program to display a digital clock which displays the current time of the server.

8. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.

9. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.

10. Write a PHP program to store page views count in SESSION, to increment

	the count on each refresh, and to show the count on web page. 11. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name. 12. Build a Rails application to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
Course Outcomes	After studying this course, students will be able to: • Use JavaScript and XHTML to create web pages with advanced interactivity. • Program basic functions in JavaScript and XHTML • Use JavaScript to create functional forms • UseJavaScript to control browser frames and windows • Use cascading style sheets to design web pages
Text Books	• Agile Development with Rails 7. Ruby, S. with D. Thomas, 2022. • The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer
Reference Books	• ASP.NET Core 3 and Angular 9: Full-stack web development with .NET Core 3.1 and Angular 9

Course Title	Software Testing Lab				
Course Code	**SMC04392**				
Semester	**3rd**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	A basic knowledge of programming.				
Course Objectives	(Any 10) 1. To provide knowledge of Software Testing Methods. 2. To develop skills in software test automation and management using latest tools.				
Course Contents	1. Recording in context sensitive mode and analog mode 2. GUI checkpoint for single property 3. GUI checkpoint for single object/window 4. GUI checkpoint for multiple objects 5. a) Bitmap checkpoint for object/window a) Bitmap checkpoint for screen area 6. Database checkpoint for Default check 7. Database checkpoint for custom check 8. Database checkpoint for runtime record check 9. a) Data driven test for dynamic test data submission b) Data driven test through flat files c) Data driven test through front grids d) Data driven test through excel test 10. a) Batch testing without parameter passing b) Batch testing with parameter passing 11. Data driven batch 12. Silent mode test execution without any interruption 13. Test case for calculator in windows application				

Course Outcomes	1. Design and develop the best test strategies in accordance to the development model.
Text Books	• Effective Methods for Software Testing, William E. Perry, John Wiley and Sons, • Effective Software Testing: 50 Specific Ways to Improve Your Testing, Dustin, Pearson Education, 2002. • An Integrated Approach to Software Engineering, PankejJalote, Narosa Publishing House, New Delhi 1997. • The Art of Software Testing, GlenfordJ.Myers, John Wiley & Sons, 1979. • Software Testing: A Craftman's Approach, P. C. Jorgensen, CRC Press, 1995.
Reference Books	• Software Testing Techniques, Boris Beizer, Dreamtech, 2006. • Software Testing: Principles and Practices, Srinivasan Desikan, Gopala swamy Ramesh, Pearson Education, 2008. • Software Testing, Aditya P. Mathur, Pearson Education, 2008. • Software Testing: Principle, Techniques and Tools, M. G. Limaye, Tata McGraw Hill, 2009.

Course Title	Elective- III Machine Learning Lab
Course Code	**SMC04393**
Semester	**3rd**
Course Credit	<table><tr><td>L</td><td>T</td><td>P</td><td>T C</td></tr><tr><td>3</td><td>1</td><td>-</td><td>4</td></tr></table>
Prerequisites	Basic knowledge of Algorithms
Course Objectives	The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.
Course Contents	1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%) 2. Extract the data from database using python 3. Implement k-nearest neighbours classification using python 4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids) VAR1 VAR2 CLASS 1.713 1.586 0 0.180 1.786 1 0.353 1.240 1 0.940 1.566 0 1.486 0.759 1 1.266 1.106 0 1.540 0.419 1

	0.459 1.799 1 0.773 0.186 1 5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness. medium skiing design single twenties no ->highRisk high golf trading married forties yes ->lowRisk low speedway transport married thirties yes ->medRisk medium football banking single thirties yes ->lowRisk high flying media married fifties yes ->highRisk low football security single twenties no ->medRisk medium golf media single thirties yes ->medRisk medium golf transport married forties yes ->lowRisk high skiing banking single thirties yes ->highRisk low golf unemployed married forties yes ->highRisk Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset? 6. Implement linear regression using python. 7. Implement Naïve Bayes theorem to classify the English text 8. Implement an algorithm to demonstrate the significance of genetic algorithm 9. Implement the finite words classification system using Back-propagation algorithm
Course Outcomes	After the completion of the course the student can able to: 1. understand complexity of Machine Learning algorithms and their limitations; 2. understand modern notions in data analysis-oriented computing; 3. be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;

Text Books	Introduction to Linear Regression Analysis, Fifth Edition - DOUGLAS C. MONTGOMERY, ELIZABETH A. PECK, G. GEOFFREY VINING, A JOHN WILEY & SONS, INC., PUBLICATION.
	Introduction to Machine Learning - EthemAlpaydm, The MIT Press
Reference Books	Python Machine Learning - Sebastian Raschka, PACKT Publishing
	Using Multivariate Statistics - Barbara G. Tabachnick, Linda S. Fidell, Pearson Education Inc.

Course Title	**Elective- III Automation and Configuration Management Lab**
Course Code	**SMC04393**
Semester	**3rd**
Course Credit	**L T P TC** **3 1 - 4**
Prerequisites	Nill
Course Objectives	The Objective of this course is to give a strong foundation of System Provisioning and Configuration Management.
Course Contents	(Any 10) 1. SETTING UP ANSIBLE. 2. WRITING PLAYBOOKS USING YAML. 3. DEPLOY A NON-TRIVIAL APPLICATION USING ANSIBLE. 4. WORKING WITH ROLES TO SIMPLIFY AND REUSE PLAYBOOKS. 5. MAKING PLAYBOOKS RUN FASTER WITH SSH MULTIPLEXING, PIPELINING, AND PARALLELISM. 6. USING ANSIBLE TO CREATE DOCKER IMAGES AND DEPLOYING DOCKER CONTAINERS. 7. E2, SECURITY GROUP, IAM POLICY 8. VPC 9. S3 BUCKET 10. TCL, VARIABLES 11. STATE MANAGEMENT 12. WORKSPACES 13. MODULES
Course Outcomes	On completion of this course, the students will be able to:- • Understand provisioning on Cloud. • Learn automation, preventing errors, tracking of changes. • Understand configuration management.
Text Books	• Get started with Ansible - by Lorin Hochstein. • Ansible Configuration Management - by Daniel Hall.

Reference Books	• Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001. • Royce, "Software Project Management", Pearson Education, 1999. •Jalote, "Software Project Management in Practice", Pearson Education, 2002.