Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
(Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur)
Kannada Linguistic Minority Institute

NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

PG Science Programme : M.Sc CS -II To be implemented from A.Y. 2021-2022

System : Choice Based Credit System [CBCS] with SGPA and CGPA

B.O.S. in* :M.Sc Computer Science Structure and Examination Pattern

Semester	Code	Title of the Paper	Examination			L	T	P	Credits
			SE	CA	Total				
Sem-III		**Hard Core**							
	HCT 3.1	PHP and JQuery	70	30	100	4	--	--	4
	HCT 3.2	Android Programming	70	30	100	4	--	--	4
		Soft Core [Any one]							
	SCT 3.1	Data Warehouse and Data Mining	70	30	100	4	--	--	4
	SCT 3.2	Internet of Things	70	30	100	4	--	--	4
		Open Elective[Any one]							
	OET 3.1	Linux Operating System	70	30	100	5	--	--	5
	OET 3.2	Computer Communication Network	70	30	100	5	--	--	5
		Lab							
	HCP3.1	Practical based on HCT 3.1	35	15	50	--	--	03	2
	HCP3.2	Practical based on HCT 3.2	35	15	50	--	--	03	2
	SCP 3.1 / 3.2	Practical based on SCT 3.1 / 3.2	35	15	50	--	--	03	2
	HCP 3.3	Project-III	35	15	50	--	--	03	2
	Total for Semester-III		**420**	**180**	**600**	**--**	**--**	**--**	**25**
Sem-IV		**Hard Core**							
	HCT 4.1	Dot Net technology	70	30	100	4	--	--	4
	HCT 4.2	Soft Computing	70	30	100	4	--	--	4
	HCT 4.3	R Programming	70	30	100	4	--	--	4
		Soft Core [Any one]							
	SCT 4.1	Artificial Intelligence	70	30	100	4	--	--	4
	SCT 4.2	Big Data Analytics	70	30	100	4	--	--	4
		Lab							
	HCP 4.1	Practical based on HCT 4.1	35	15	50	--	--	03	2
	HCP 4.2	Practical based on HCT 4.2	35	15	50	--	--	03	2
	HCP 4.3	Practical based on HCT 4.3	35	15	50	--	--	03	2
	HCP 4.4	Project-IV	35	15	50	--	--	03	2
		Tutorial	---	25	25	--	1	--	1
	Total for Semester-IV		**420**	**205**	**625**	**--**	**--**	**--**	**25**

HCT 3.1	Title:PHP and JQuery	Lectures
Unit-I	**PHP Basics** Introduction, XAMPP & WAMPP, Configure php.ini, PHPSyntax, Variables, Strings, Constants, Operators, Echo /Print, If, Else. Elseif, Switch ,Loop:For, Foreach, While, Functions, user defined functions. **Session and Cookies :**introduction, Start a PHP session, session variables, modifysession , destroysession, Cookies ,Start a PHP Cookies, Cookie variables ,modify Cookie, destroy Cookie **Exception Handling:** Error handling, try-catch-throw, Exception, Filters, FilersAdvanced.	15
Unit –II	**Introduction to MySQL** CREATE, READ, UPDATE, DELETE, SEARCH data from table, Database Programming -PHP & MySql, architecture, PHP MySql functions for data manipulation	15
Unit-III	**MVC Overview** **Codeigniter:** Models, views, controllers, Installation, Working with Simple DatabaseProgram **Laravel:** Introduction of Laravel, Installation, DirectoryStructure ,URLRouting, Controller,View Passing Data inView, PrintVariable, ControlStatement, Build MasterLayout	15
Unit-IV	**Jquery** jQuery Introduction, jQuery Installation, Alternatives to Downloading, jQuery Basics, jQuery Selectors: CSS Element ,Selector,NameSelector, IDSelector,ClassSelector,UniversalSelector,Multiple Elements E, F, G Selector,jQuery - Attributes: Get Attribute Value,Set Attribute Value, Attribute Methods jQuery - DOM Traversing: for loop, each() Method, JQuery DOM Filter Methods, JQuery DOM Traversing Methods,jQuery–CSS: Applying CSS, Setting Element Width & Height jQuery–DOM Manipulation: Content Manipulation, Element Replacement, Removing DOM Elements, after(),before(),append(),empty(), prepend(), remove(), text(),val(), jQuery EventsHandling,lick(),bind(),blur(),hover(), change(),trigger(),dblclick(),keydown(), keypress(),keyup(), mouseover(),mouseout(), jQuery Chaining,jQuery-Ajax: load(),get(),post(),ajax(),Getting JSON Data,Post JSON Data.	15

Reference Books:

1. PHP: The Complete Reference-Steven Holzner.
2. Professional PHP 5-Ed Lecky-Thompson,HeowEide-Goodman, StevenD. Nowicki
3. Programming PHP- Rasmus lerdorf, Kevin Tatroe.
4.Learning php, mysql, javascript and css –Oreilly- Robin Nixon
5.jQuery Reference Guide by Chaffer Jonathan
6.Learning jQuery - Jonathan Chaffer, Karl Swedberg

HCT 3.2	Title:Android Programming	Lectures
Unit-I	**Android Fundamentals** Introduction to Android - Overview and evolution of Android , Features of Android, Android architecture, Components of an Android Application, Manifest file, Android Activity ,Service Lifecycle **Android UI Design** Basic UI Designing (Form widgets ,Text Fields , Layouts, [dip, dp, sip, sp] versus px) intent(in detail),All components (e.g Button , Slider, Image view, Toast) Event, Handling, Adapters and Widgets, Menu, Listview, listview events, recycler view , recycler view, Fragments, Dialogues	15
Unit –II	**Advanced Android Programming** Content Providers – SQLite Programming, JSON Parsing, Accessing Phone Service(Call, SMS, MMS),Location based services	15
Unit-III	**Advanced Android Programming** Content Providers – SQLite Programming, JSON Parsing, Accessing Phone Service(Call, SMS, MMS),Location based services	15
Unit-IV	**IOS Fundamentals** Introduction to IOS ,IOS Architecture, Frameworks, Application Life Cycle, Features **Swift -** Introduction to Swift , General Concepts of Swift **Xcode -** Introduction to Xcode , Navigator, Editor Utility, Tools, Console, Document, Simulator, Instruments **Startup -** Application Templates, Introduction to Storyboard , Hello World Application, How 'Hello World' Working, Debugging Database, Plist, Preference, Sqlite Web Service, Restful Web Service (JSON & XML)	15

Reference Books:

1.Kotlin Programming: The Big Nerd Ranch Guide
2.Java – The Complete Reference
3.Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides)
4.iOS 10 Programming Fundamentals with Swift: Swift, Xcode, and Cocoa Basics Paperback by Matt Neuberg (Author)

SCT 3.1	Title: Data Warehouse and Data Mining	Lectures
Unit-I	**Introduction:** Data Warehousing-Basic concepts, Data cube and its computation, Data Mining-KDD, Functionalities, Data Preprocessing and Data Visualization, Primitives	15
Unit –II	**Mining Frequent Patterns, Associations and Correlations:** Market Basket Analysis, Frequent Itemset Mining Methods, Pattern Evaluation Methods, Mining Multilevel, Multidimensional Associations.	15
Unit-III	**Classification and Predication:** Decision Tree Induction, Naïve Bayesian Classification, Associative Classification, Classification by Back propagation, Model Evaluation, Improving Classification Accuracy	15
Unit-IV	**Cluster and Outlier Analysis:** What is Cluster Analysis? Clustering Methods- Partitioning method, Hierarchical method, Density-Based method, Model-based methods Outlier and its detection **Applications and Trends in Data Mining:** Visual and Audio Data mining, Statistical data mining, Data Mining Applications, Data Mining Trends	15

Reference Books:

1.Data Mining Concepts and Techniques (3rd Edition): Jiawei Han, MichelineKamber, Jian Pei -Morgan Kaufmann Publishers
2.Modern Data Warehousing, Mining and Visualization: George M.Marakas, Pearson Education

SCT 3.2	Title: Internet of Things	Lectures
Unit-I	Introduction to IoT, IoT and Digitization, Impact, Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.	15
Unit –II	IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.	15
Unit-III	An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Var	15
Unit-IV	IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints – RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi, Wireless Temperature Monitoring System Using Pi,Remote access to RaspberryPi, An IoT Strategy for Smarter Cities, Smart City IoT Architecture	15

Reference books:

1.Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition,

2.Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill

3.David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1stEdition, Pearson Education

4.Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017

OET 3.1	Title: Linux Operating System	Lectures
Unit-I	**Introduction of Linux** : History of Linux, Architecture of Linux system & features, Shell & its type, Difference between Windows and Linux. Linux Distributions, **Installing and Configuring Linux OS.** **Linux File System**: Hierarchy of File system, File System parts-Boot Block, Super Block, Inode Block, Data Block, File types, Mounting devices (CD/DVD, USB, hard drive partition).	10
Unit –II	**Users & Groups Management** : Create and manage Users or groups. Assigning permissions to users and Groups, File and Directory permissions- chmod, chown, chgrp. **Linux commands :** **File and directory Management Commands**:-mkdir, rmdir, cd ,pwd, file, mv, rm, ls, cat, more, less. **Filter Commands & Editor**:-Filters: head, tail, pr, cut, paste, sort, uniq, tr, grep,egrep, fgrep, sed. **Communication commands**:- mesg, talk, write, wall, mail.	10
Unit-III	**Text Editors** : vi, vim, Archive and File compression commands. **Process Management**: Shell process, System process, background and foreground process, Changing process priority with nice. Listing processes-jobs, ps, kill- premature termination of process. **Security Enhanced Linux :** Authentication-Setting Passwords, Role of system administrator	10
Unit-IV	**Introduction to LibreOffice :** **Writer (word processor) :** creating letters, books, reports, newsletters, brochures, and other documents. inserting graphics and objects from other components into Writer documents. **Calc (spreadsheet) :** Working with functions for financial, statistical, and mathematical operations. Generating 2D and 3D charts. **Impress (presentations) :** Working with common multimedia presentation tools, special effects, animation, and drawing tools. Adding sounds & video clips	10

Reference Books :

1. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
2. UNIX concepts and applications by sumitabha das, mcgraw hill publication
3. Linux Kernel Development by Pearson (3rd Edition)
4. The Linux Programming Interface by Michael Kerrisk
5. LibreOffice 4.2 Writer Guide by Libreoffice Documentation Team

OET- 3.2	Title: Computer Communication Network	Lectures
Unit-I	**Computer Network**: Introduction of Network, Uses of computer network. **Network Components:** Hubs, Switches, Repeaters, Bridges, Routers, Gateways, Network adapters, Network Topologies, Types of Networks, Inter-networking. **Reference Model:** ISO-OSI reference model, TCP/IP reference model. Connectionless ,connection oriented service	10
Unit –II	**Transmission Media & Transmission Modes** **Guided Media** :Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optic Cable **Unguided Media** : Wireless Radio Waves Microwaves, Infrared, Satellite Communication, Wireless LAN, Bluetooth Analog Transmission: Modem. **Transmission Mode** :Parallel, Serial, Synchronous Transmission, Asynchronous Transmission, Modulations and types :frequency, amplitude ,phase Multiplexing and types :Frequency, time and wavelength, Switching techniques :Circuit, Message, Packet	10
Unit-III	**Network basic and configuration :** **Network Protocols :** FTP, DNS, TelNet, SMTP, POP, HTTP, WWW, SNMP, ARP, RARP etc. **Inside the PC:** Opening the PC and identification, Study of different blocks, Assembling and disassembling. **Network basic and configuration:** Setting IP addresses, Sharing files and folders .Network troubleshooting. PING test, ipconfig etc.	10
Unit-IV	**Introduction to servers and network security :** **Types of servers:** Files servers, Email Servers, Proxy servers etc. Basics of Internet and Intranet **Types of Internet connections:** Dialup, Broadband, Leased Line, Wi-Fi, Wi-Max, 2G, 3G, 4G, WWW, E-mails, Search Engines, Social Networking. Cloud application, Audio-video Conferencing. Voice over Internet Protocol (VOIP),**Recovery and backup,Essential security measures.**	10

Reference Books :

1. Computer Networking by Tannenbaum.
2. Network Security Essentials by William Stallings
3. Dorothy E. Denning, "Cryptography and Data Security", Addison-Wesley
4. Data communication and networking by William Stallings
5. Complete Reference Red Hat Enterprise Linux & Fedora Edition by Petersen Haddan
6. Analogue Network Security by Winn Schwartau, Kayley Melton & Alissa Phillips, Mark Carney

HCT 4.1	Title: Dot Net technology	Lectures
Unit-I	**Introduction to .NET and ASP.NET :** Block diagram of .net framework, The Common Language Runtime, Introduction & difference between ASP & ASP.Net 1.1 & 2.0 Application, Web Architecture Model **Application and Page Frameworks:** Application Location Options, The ASP.NET Page Life Cycle, The ASP.NET Page Structure Options, ASP.NET Page Directives, ASP.NET Page Events, Dealing with PostBacks, ASP.NET Application Folders, Global.asax **ASP.NET Server Controls and Validation Controls:** ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation.	15
Unit –II	**Working with Master Pages:** Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events. **Site Navigation:** Site Navigation technique, SiteMap file, SiteMapPath, TreeView and MenuView control, Using XML file. **ASP.Net State Management:** Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules. **Data Access with ADO.NET:** ADO.NET Overview, Using Database Connections, Commands-Executing Commands, Calling Stored Procedures, Fast Data Access: The Data Reader, Data Adapter.	15
Unit-III	**ASP.NET MVC:** Introduction to .Net MVC Framework, MVC Framework Features, MVC Architecture,ASP.NET MVC Vs ASP.NET Web Forms, MVC Components, MVC Application Folders, Configuration files, golbal.asax, packages.config, web.config, routing **Controllers:** The Controller's Role,Action Methods, Parameters in Controller Actions **Views:** The Purpose of Views,View Basics, Strongly Typed Views, Understanding ViewBag, ViewData,The Razor View Engine, Razor Expressions, Razor Code Blocks, Layouts, Specifying a Partial View, ViewStart, Models and Stronlgy Typed View **Forms :** The Action and the Method, GET or POST **HTML Helpers:** Automatic Encoding, Making Helpers Do Your Bidding,Strongly Typed Helpers, Templated Helpers, Html.ActionLink	15
Unit-IV	**Data Annotations and Validation :** Using Validation Annotations,Custom Error,Messages, Display,DisplayFormat, ReadOnly, DataType,Key,HiddenInput **Entity Framework:**DB-First Approach, DbContext Class, Executing the Scaffolding Template **Introduction to AJAX:** Unobtrusive JavaScript,Ajax Helpers,JSON and Client-Side Templates	15

Reference books:

1.Professional ASP.NET MVC,Wrox Publication
2.Pro ASP.NET MVC 5, Apress

HCT 4.2	Title:Soft Computing	Lectures
Unit-I	**Fundamentals of Neural Networks:** Basic concepts, models of artificial neuron, neural network architectures, characteristics, learning methods. **Backpropagation networks**: Architecture, backpropagation learning: input, hidden and output layer computation, error calculation, training of neural network, effect of learning rate, backpropagation algorithm.	15
Unit –II	**Crisp Sets:** an Overview, Fuzzy Sets: Basic Types, Basic Concepts, Fuzzy Sets Vs Crisp Sets, Additional Properties of alpha cuts, Presentation of fuzzy sets, Extension principle for fuzzy sets.	15
Unit-III	**Operations on Fuzzy Sets:** Types of operations, Fuzzy complements, Fuzzy Intersections, Fuzzy Unions, Crisp and Fuzzy Relation, Binary Fuzzy Relations, Binary Relation on single set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relation, Defuzzification: Lambda-cuts for fuzzy sets, Lambda-cuts for fuzzy relations, Defuzzification methods.	15
Unit-IV	**Basic concepts, working principle, Genetic representations, Encoding**: binary, octal, hexadecimal encoding, permutation encoding, value encoding, tree encoding, Fitness function, Reproduction: Roulettewheel selection, Tournament selection, Rank selection, Mutation operator, Generational Cycle, applications.	15

Reference books:

1.Neural Networks, Fuzzy Logic and Genetic Algorithms: S. Rajasekaran, G. A. VijayalakshmiPai, PHI.
2.Fuzzy Sets and Fuzzy Logic Theory and Application: George J. Klir, Bo Yuan, PHI.
3.Fuzzy Sets Uncertainty and Information: George J. Klir, Tina A. Floger, PHI.
4.Introduction to the Theory of Neural Competition John hertz, Krogh and Richard, Addison Wesley.
5.Introduction to Artificial Neural Network: Jaeck M. Zurada, Jaico Publishing House.
6. Neural Network and Fuzzy System A Dynamic System: Koska, PHI.

HCT 4.3	Title:R Programming	Lectures
Unit-I	**Fundamental of R:** Introduction to R, Data Types, Data input/output Creation of vector using commands: c , rep , seq, scan. Creation of data frame using commands: data frame, edit, Arithmetic operation on vectors. Diagrammatic and Graphical representation of data- Simple bar diagram, subdivided bar diagram, pie diagram, histogram, frequency polygon, ogive curves, Box plot.	15
Unit –II	**Descriptive Statistics:** **Measures of Central Tendency** - A.M. G.M. H.M., Median, Mode, Partition values. Measures of Dispersion- Range, Quartile deviation, mean deviation, standard deviation, CV. Bivariate Data: Correlation and Regression in R.	15
Unit-III	**Simulation of Random Numbers** Simulation in R for Discrete distributions- Bernoulli, Binomial and Poisson distribution. Simulation in R for Continuous distributions- Exponential and Normal distribution	15
Unit-IV	**Hypothesis testing in R** Tests of Hypothesis: t- test (one sample), t- test (two sample), Paired t- test and F- test, Chi-square test for goodness of fit, Large sample tests. One way ANOVA.	15

Reference Books

1.Learning R: A Step-by-Step Function Guide to Data Analysis 1st Edition by Richard Cotton (Author)
2.The Art of R Programming, Norman Matloff, Cengage Learning
3.R for Everyone, Lander, Pearson
4.Siegel, S. (1956), Nonparametric Statistics for the Behavioral Sciences, McGraw-Hill International, Auckland
5.R Cookbook, PaulTeetor, Oreilly
6.R in Action, Rob Kabacoff, Manning

SCT 4.1	Title:Artificial Intelligence	Lectures
Unit-I	**Introduction:** Turing Test, What is AI, Applications of AI, The AI Problems and Techniques **Problems, Problem Spaces and Search:** Defining the problem as a state space search: example, production systems, problem characteristics, Issues in the Design of Search Programs **Heuristic Search Techniques:** Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-EndsAnalysis	15
Unit –II	**Knowledge Representation:** Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Resolution, Forward Versus Backward Reasoning **Slot-and Filler Structures:** Semantic Nets, Frames, Conceptual Dependency, Scripts	15
Unit-III	**Statistical Reasoning:** Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Fuzzy Logic	15
Unit-IV	**Game Playing:** Minmax Search Procedure, Adding Alpha-Beta Cutoffs, Iterative Deepening **Learning:** What is learning? Learning by induction, Learning in Neural Networks, Recurrent Networks **Natural Language Processingand Expert systems:** Steps in Natural Language Processing,Parsing, ATN,Representing and Using Domain Knowledge, ExpertSystem Shells, Explanation, Knowledge Acquisition	15

Reference Books:

1.Artificial Intelligence: Elaine Rich, Kevin Knight, TMH, 3rdEdition.
2.Introduction to Artificial Intelligence and Expert Systems: D WPatterson, PHI, 2nd Edition.

SCT-4.2	Title:Big Data Analytics	Lectures
Unit-I	**"Big Data" in the Enterprise** Big Data Concepts, Challenges. Opportunities from Big Data Enterprise Information Management :New Approach to Enterprise Information Management For Big Data, Capabilities needed for Big data **Big Data Implications for Industries:** Big Data Analytics, Telecom/Banking/Retail/HealthCare/IT/Operations **Emerging Database Landscape:** Scale-Out Architecture, RDBMS Vs Non-Relational Database Database Workload & its Characteristics ,Implication Of Big data Scale on Data Processing	15
Unit –II	**Application Architectures For Big Data And Analytics** Big Data Warehouse & Analytics, Big data Warehouse System requirements & Hybrid Architectures Enterprise Data Platform Ecosystem, Big Data and Master Data Management	15
Unit-III	**Hadoop Framework** Hadoop Architecture, History of Hadoop – Facebook, Dynamo, Yahoo, Google Components Of Hadoop Framework :HDFS, MAP Reduce Introduction to Pig, Hive, Mahout, Sqoop Installation of Single Node cluster, Multi-Node Cluster- installation of Java, hadoop configuration	15
Unit-IV	**Big Data Analytics Methodology** Big data Analytics Methodology- Analyze & Evaluate Business Cases Develop Business Hypothesis-Analyze outcomes, Build & Prepare Data sets, Select & Build Analytical Model, Design For Big data Scale, Build production ready System, Setting up the Big Data Analytics System, Gathering data, Measure & Monitor.	15

Reference Books

1.Data Analytics Made Accessible by Anil Maheshwari
2.Ten Signs of Data Science Maturity by Peter Guerra and Kirk Borne
3.Too Big to Ignore: The Business Case for Big Data by award-winning author P. Simon