Annexure: III

BHARATHIAR UNIVERSITY, COIMBATORE–641 046
DEPARTMENT OF COMPUTER APPLICATIONS
M. Sc (DATA ANALYTICS) – (CBCS) University Dept.
(Effective from the academic Year 2018-2019)

1. Eligibility for Admission

A pass in any Bachelor's degree of minimum 3 years duration with Mathematics or Statistics as any one of the subjects at Graduate level.

2. Duration

The programme shall be offered on a full-time basis. The programme will consist of three semesters of course work and laboratory work and the fourth semester consists of project.

3. Regulations

The general Regulations of the Bharathiar University Choice Based Credit System Programme are applicable to these programmes.

4. The Medium of Instruction and Examinations

The medium of instruction and Examinations shall be in English.

5. Submission of Record Notebooks for Practical Examinations & Project Viva-Voce.

Candidates taking the Practical Examinations should submit bonafide Record Note Books prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Practical Examinations. Candidates taking the Project Viva Examination should submit Project Report prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Project Viva-voce Examination.

6. Ranking

A candidate who qualifies for the PG Degree Course passing all the Examinations in the first attempt, within the minimum period prescribed for the Course of Study from the date of admission to the Course and secures 1st   or 2nd Class shall be eligible for ranking and such ranking will be confined to 10% of the total number of candidates qualified in that particular subject to a maximum of 10 ranks.

7. Revision of Regulations and Curriculum

The above Regulation and Scheme of Examinations will be in vogue without any change for a minimum period of three years from the date of approval of the Regulations. The University may revise/amend/ change the Regulations and Scheme of Examinations, if found necessary.

M.Sc. DATA ANALYTICS Univ.Dept.
(Effective from the academic Year 2018-2019 and
for those admitted during 2017-2018)
SCHEME OF EXAMINATIONS

SEM	Course Code	SUBJECT	L	P	CREDIT	MARK
I	18CSEGC01	Principles of Data Science	4	0	4	100
I	18CSEGC02	Mathematics for Computing	4	0	4	100
I	18CSEGC03	Operating System	4	0	4	100
I	18CSEGC04	Python Programming	2	2	4	100
I	18CSEGC05	Design and Analysis of Algorithms &Object Oriented Programming	4	0	4	100
I	18CSEGC06	Soft Skill – I	2	2	4	100
I	General	General Supportive	2	0	2	50
II	18CSEGC07	Advanced Database Management	2	2	4	100
II	18CSEGC08	Operations Research	4	0	4	100
II	18CSEGC09	R Programming for Data Analytics	2	2	4	100
II	18CSEGC10	Data Mining	4	0	4	100
II	18CSEGC11	Evolutionary Computing	4	0	4	100
II	18CSEGEXX	Elective-I	4	0	4	100
II	General	General Supportive	2	0	2	50
III	18CSEGC12	Cloud Computing	4	0	4	100
III	18CSEGC13	MapReduce Programming	2	2	4	100
III	18CSEGC14	Machine Learning	2	2	4	100
III	18CSEGC15	Soft Skills - II	2	2	4	100
III	18CSEGEXX	Elective II	4	0	4	100
III	18CSEGEXX	Elective-III	4	0	4	100
III	General	General Supportive	2	0	2	50
III	18CSEGC16	Mini Project and Viva Voce			2	50
IV	18CSEAOXX	Online Courses*****	4	0	4	100
IV	18CSEGC17	Project and Viva Voce			10	250
		Total			94	2350

* Online courses - This can be availed by the students at anytime during the course of study. The credits will be given along with the fourth semester marks. Four weeks of online course is considered as one credit course. Students are expected to produce certificates from Swayam, NPTEL, Spoken Tutorial of IIT Mumbai, Coursera and equivalent.

M. Sc (Data Analytics) Electives					
Course Code	**Subject**	**L**	**P**	**Credit**	**Mark**
18CSEGE01	Internet of Things and Wireless Sensor Networks	4	0	4	100
18CSEGE02	Text Analytics	4	0	4	100
18CSEGE03	Data Visualization	2	2	4	100
18CSEGE04	Social Media Mining	4	0	4	100
18CSEGE05	Sentiment Analysis	4	0	4	100
18CSEGE06	Progressive Web Application Development	2	2	4	100

Online Courses for M.Sc. Data Analytics

1. National Programme on Technology Enhanced Learning **- (NPTEL)**

Course	**Duration**	**Course Period**	**Website**	**Course Fee**
Design and Analysis of Algorithm	08 Weeks	Aug 27 - Oct 19, 2018	https://onlinecourses.nptel.ac.in/noc18_cs37/preview	Rs 1,100
Deep Learning	12 Weeks	July 30 , Oct 19, 2018	https://onlinecourses.nptel.ac.in/noc18_cs41/preview	Rs 1,100
Database Management System	08 Weeks	Aug 06, Sep 28, 2018	https://onlinecourses.nptel.ac.in/noc18_cs36/preview	Rs 1,100
Scalable Data Science	08 Weeks	Aug 06 – Sep 28, 2018	https://onlinecourses.nptel.ac.in/noc18_cs39/preview	Rs 1,100
Computer Networks and Network Protocol	12 Weeks	July 30 – Oct 19, 2018	https://onlinecourses.nptel.ac.in/noc18_cs29/preview	Rs 1,100
Programming in C++	08 Weeks	Aug 06 – Sep 28, 2018	https://onlinecourses.nptel.ac.in/noc18_cs32/preview	Rs 1,100
Programming, data structures and algorithm using python	08 Weeks	Aug 06 – Sep 28, 2018	https://onlinecourses.nptel.ac.in/noc18_cs34/preview	Rs 1,100

2.SWAYAM – Online Education

Course	Duration	Course Period	Website	Course Fee
Cyber Law	94 Hrs	Sep 10 – Oct 31, 2018	https://swayam.gov.in /courses/public	Free
Information Security	108 Hrs	Sep 10 – Oct 29, 2018	https://swayam.gov.in /courses/public	Free
E-Governance	60 Hrs	Sep 04 – Dec 07, 2018	https://swayam.gov.in /courses/public	Free
Information Technology	15 Hrs	Oct 01 – Nov 24, 2018	https://swayam.gov.in /courses/public	Free

3. IBM – Online Courses

Course	Duration	Course Period	Website	Course Fee
Statistics 101	6 Hrs	-	https://cognitiveclass.ai/cours es/statistics-101/	Free
Machine Learning with Python	12 Hrs	-	https://cognitiveclass.ai/cours es/machine-learning-with-python/	Free

4. Stanford School of Engineering - Machine Learning

Course	Duration	Course Period	Website	Course Fee
Machine Learning	Based on Session	Autumn : Aug 1 - Sep 10, 2018 Winter: Oct 28 - Dec 10, 2018 Spring : Feb 10 - Mar 18, 2018 Summer: Apr 7 - Jun 17, 2018	https://online.stanfor d.edu/courses/cs229-machine-learning	Free

BHARATHIAR UNIVERSITY:: COIMBATORE-641046
DEPARTMENT OF COMPUTER APPLICATIONS
M. Sc (DATA ANALYTICS) - OBE FORMAT

On completion of M.Sc. Data Analytics Programme, the students will be able to

PO1: Apply knowledge of mathematics, statistics, science and computing appropriately to model the software applications, configure software platform and analyze real time data in heterogeneous domains.

PO2: Identify and formulate methods to analyze complex problem using computing tools and techniques for analytical practice.

PO3: Design a system, component or process, tools to meet desired needs within realistic constraints such as economic, environmental, social, and ethical and safety contexts

PO4: Have an ability to design, implement, evaluate, analyze, interpret complex problems and data, provide sustainable computational solutions and synthesis of information to provide valid conclusion for domains of business, healthcare, environment,.

PO5: Create, Select and apply appropriate technologies, tools, techniques for data modeling, processing of complex problems and prediction for data analysis.

PO6: Communicate effectively with the computing community, and with society, about complex computing activities by being able to comprehend and write effective reports, design documentation, demographics and make effective presentations.

PO7: Manage projects and function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO8: Understand the impact of professional analytical solutions in societal and environmental contexts and apply the knowledge for benefit of individual for sustainable development.

PO9: Recognize the need for, and prepare them to engage in independent and life-long learning in the context of technological advancementsfor the betterment of individuals, organizations, research community and society.

PO10: Apply ethical principles, commit to professional ethics and responsibilities and human values.

PO11: Utilize the knowledge of education in understanding of data, management principles, computing solutions to apply on one's own work, as a member and leader in a team to manage project in multidisciplinary environments and societal contexts.

PO12: Innovate and contribute value and wealth for the benefit of the society.

Course Title   : PRINCIPLES OF DATA SCIENCE   **No. of Credits: 4**

Course Code :18CSEGC01   **No. of Teaching Hours:T-60, P-0**

Course Objectives

To impart knowledge to make the students

1. To understand Data source evolution, data Characteristicsand data processing models.
2. To understand and apply data process architecture HADOOP, SPARK and write MapReduce programs.
3. To analyze Big Data use cases for specific domain and applications.

UNIT I

Data Evolution: Data Development Time Line – ICT Advancement-a Perspective – Data Growth-a Perspective – IT Components-Business Process – Landscape-Data to Data Science – Understanding data: Introduction – Type of Data: Numeric – Categorical – Graphical – High Dimensional Data — Data Classification – Hot Data – Cold Data – Warm Data – Thick Data – Thin Data - Classification of digital Data: Structured, Semi-Structured and Un-Structured. Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution – Data Sources

UNIT II

Data Science: Data Science-A Discipline – Data Science vs Statistics – Mathematics - Programming Language - Database, - Machine Learning. Data Analytics Relation: Data Science, Analytics, Big Data Analytics. Data Science Components: Data Engineering, Data Analytics-Methods and Algorithm, Data Visualization Big Data: Introduction To Big Data: - Evolution What is Big Data – Sources of Big Data. Characteristics of Big Data 6Vs – Big data- Challenges of Conventional Systems- -– Data Processing Models – Limitation of Conventional Data Processing Approaches – Big Data Myths - Data Discovery-Traditional Approach, Big Data Technology: Big Data Exploration - Data Augmentation – Operational Analysis – 360 View of Customers – Security and Intelligence

UNIT III

Hadoop: Basic Concepts-An Overview of Hadoop-The HadoopDistributed File System-Anatomy of a Hadoop Cluster-Hadoop Ecosystem Components. Replica-Hadoop Processes-Name node-Secondary name node-Job tracker-Task tracker-Data node – Hadoop YARN – Hadoop Limitation - SPARK – in Architecture – SPARK Advantages - HBASE: HBase Architecture-HBase API-Managing large data sets with HBase

UNIT IV

Map Reduce: Developing Map Reduce Application - Phases in Map Reduce Framework - Map Reduce Input and Output Formats - Advanced Concepts - Sample Applications – Combiner – Joining datasets in Mapreduce jobs – Map - side join – Reduce - Side join - Map reduce –

customization - **Map Reduce Program:** Introduction to Writing a MapReduce Program - The MapReduce Flow - Examining a Sample MapReduce Program- Basic MapReduce API Concepts - The Driver Code - The Mapper - The Reducer - Example

UNIT V

Big Data Usecases –Big Data Technology Potentials – Limitations of Big Data and Challenges-Big Data Roles Data Scientist , Data Architect, Data Analyst – Skills – Case Study : Big Data – Customer Insights – Behavioral Analysis – Big Data Applications - Marketing – Retails – Insurance – Risk and Security – Health care

REFERENCE

1. V. Bhuvaneswari, T. Devi, "Big Data Analytics: A Practitioner's Approach" 2016.
2. Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,"Toward Scalable Systems for Big
3. SeemaAcharya, SubhashniChellappan, "Big Data Analytics", Wiley, 2015.
4. Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,"Toward Scalable Systems for Big Data Analytics: A Technology Tutorial", IEEE, 2014

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand Data sources, generations, data formats, Data Evolution, Data from various domains	Remember Understand
CO2	Understand Big Data Characteristics What, Why, When, Limitation of traditional approaches and models. Map Big Vs to Data Domains	Apply
CO3	Understand Big Data Processing platform , frameworks , Hadoop, Spark , storage models – Hbase	Analyze
CO4	Programming Model of Big Data MapReduce, Why MapReduce, Limitations of Traditional Models	Apply
CO5	Analyze various domains of Big Data Characteristics, Platform, Programming Model	Analyze
CO6	Design Big Data framework ecosystem, and data processing framework of multidisciplinary domains	Analyze

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title : MATHEMTICS FOR COMPUTING   No. of Credits: 4

Course Code : 18CSEGC02   No. of Teaching Hours:T-60, P-0

Course Objectives

To impart knowledge to make the students

1. To understand the Probability Theory
2. To understand regression and theoretical distributions.

UNIT I

Basic probability theory - distributions and their properties - Frequency Distribution - Continuous or Grouped Frequency Distribution - Magnitude of Class intervals - Cumulative Frequency Distribution - Two Way Frequency Distribution - Measures of Central Tendency: Arithmetic Mean, Geometric Mean - Harmonic Mean - Median, Mode - Dispersion: Overview - Mean Deviation - Standard Deviation - Combined Standard Deviation.

UNIT II

Regression: Overview - Simple and multiple regression analysis - Regression, Graphical Method - Algebraic Method - Regression Line - Regression Equation, - hypothesis testing - Hypothesis - Standard Error - Test of Significance for Attributes - Test of Significance for Large Samples - Test of Significance for Small Samples - Chie Square Test - sampling - estimation theory - least square methods - SVD - transformations

UNIT III

Stochastic models compression techniques - Markov Models - Markov decision process - application in sequential decision making

UNIT IV

Theoretical Distribution: Binominal Distribution - Obtaining Coefficient - Poison Distribution - Normal Distribution - Poisson - Cumulative Poisson Process and its generalization - applications in different business domain - ARMA and ARIMA - Monte Carlo Simulations

UNIT V

Application of data analytics in different domains – Exploring Case Studies for the topics given in Unit I to Unit IV.

REFERENCES

1. R.S.N. Pillai, Bagavathi, "Statistics Theory and Practice, S.Chand& Company, 2013
2. Douglas C. Montgomery, George C. Runger., "Applied Statistics for Engineers", John Wiley   &Sons.Inc, 2003

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the principles of probability , frequency distribution measures	Understand
CO2	Understand the correlation and regression, hypothesis test, sampling techniques for specific applications	Apply
CO3	Apply probabilistic models and distribution models	Apply
CO4	Apply hypothesis testing and regression models for specific domain	Analyze
CO5	Illustrate statistical methods and Infer	Evaluate
CO6	Design statistical models for specific domains	Create

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Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title   : OPERATING SYSTEM   **No. of Credits: 4**

Course Code : 18CSEGC03   **No. of Teaching Hours:T-60 P-0**

Course Objectives

To impart knowledge to make the students

1. Understand the concepts of Operating System process, Memory and File Management.
2. Understand Linux Operating System, File Management and User Management.

UNIT I

Evolution of Operating system - System Calls, System Programs, Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads-. Process Synchronization - Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks.

UNIT II

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples. Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and File and Disk Structure, Sharing and Protection

UNIT III

Linux System- Basic Concepts; Linux Terminology – Community – Distributions - Linux File system Basics – Boot Process- Distribution Installation – Documentation – Gnu – Help – System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

UNIT IV

Linux command line – Basic operations – searching – Working with files - File operations – architecture – compressing files – File permissions - Transferring Files - Text Manipulation – cat – echo sed- awk – grep – Bash shell scripting – String manipulation – Boolean expression – case statement – looping

UNIT V

User Accounts – Environment variables – command aliases –Linux Text editors – Vi – Gedit – nano – Linux Security – Usage of root account – using sudo - limiting hardware access – working with passwords – Securing Boot Process and Hardware resources - Case study – Installation of any one Linux Distribution

REFERENCES

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts",9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, PrenticeHall, 2011.
3. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition,Tata McGraw-Hill Education, 2007.
4. http://nptel.ac.in/.
5. Linux for Beginners: An Introduction to the Linux Operating System and Command Line, Jason Cannon,

Course outcome

On the successful completion of the course, students will be able to

CO1	Describe the evolution types, structures and function of operating system	Understand
CO2	Explain techniques involved in process management and Scheduling	Apply
CO3	Explain IPC techniques, Memory Management in operating system	Apply
CO4	Describe File allocation methods , security and protection used in operating System	Analyze
CO5	Understand Linux Shell, File structure and Environment	Understand/ Apply
CO6	Apply usage of Linux editors and Linux shell commands , reading and writing files.	Apply

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title   :PYTHON PROGRAMMING   **No. of Credits: 4**

Course Code : 18CSEGC04   **No. of Teaching Hours:T-30 P-30**

Course Objectives

To impart knowledge to make the students

1.To understand the basics of Python Data structures and Programming constructs.
2.To understand and Apply Python Libraries for Data Science and Machine Learning

UNIT I

INTRODUTION

Introduction to Python: Python Introduction, History of Python, Python features , Python interpreter, Overview of programming in Python, Basic data types Python built in types, Arithmetic in Python, Program input and Program output, Variables and assignment. Global and local variables.Modules :Importing module, Math module Random module, Packages, Composition. Exception Handling .

UNIT II

ADVANCED DATA TYPES

Python Strings and string manipulation [Assigning values in strings, String manipulations, String special operators, String formatting operators, Triple Quotes, Raw String, Unicode String, Build-in-String   methods], Python   List : Introduction,   Accessing values in list, List manipulations, List Operations, Indexing, slicing & matrices. Python Dictionary - Introduction, Accessing values, Properties, Functions in Dictionary. Python Tuples : Introduction, Operation, Accessing , Function and methods in tuples andData Type Conversion.

UNIT III

CONTROL STRUCTURES

Python - Basic Operators: Arithmetic Operators ,Comparison Operators, Logical (or Relational) Operators, Assignment Operators, Conditional (or ternary) Operators Conditional Statement : Branching (if, else-if, nested),Looping : while statement, for statements, Control Statements: break, continue and pass Statements. Functions : Defining a function , Calling a function ,Types of functions , Function Arguments Anonymous functions , Regular expressions : Match function,Search function ,Modifiers. OOPs concept.

UNIT IV

PYTHON LIBRARIES FOR DATA SCIENCE

NumPy [Arrays and matrices]: N-dimensional data structure, Creating array, Indexing array, Reshaping, Vectorized operations, Pandas [Data Manipulation]: Create Data Frame, Combining Data Frames, Summarizing, Columns selection, Rows selection (basic) , Rows selection (filtering) , Sorting, Descriptive statistics, Rename values, Dealing with outliers

UNIT V

STATISTICS AND MACHINE LEARNING IN PYTHON

SciPy Introduction, Basic functions, Special functions(scipy.special), Integration(scipy.integrate), Optimization (scipy.optimize), Visualization libraries : matplotlib, Seabor. Univariate Statistics, Dimension Reduction And Feature Extraction, Classification - Case Studies

REFERENCES

1. Core Python Programming by Wesley J. Chun, 2nd Edition ,Pearson Education
2. An Introduction to Python by Guido Van Russom, Fred L.Drake, Network Theory
3. Limited.
4. Beginning Python: From Novice To Professional By Magnus Lie Hetland, Second Edition.
5. Programming in Python 3 by Mark Summerfield, Pearson Education
6. Python for Probability, Statistics, and Machine Learning, by Unpingco J.
7. Statistics and Machine Learning in Python, by EdouardDuchesnay, Tommy Löfsted

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the object oriented concepts and control structures	Understand
CO2	Understand the basic programming structure-List, Dictionary, Tuple,.	Apply
CO3	Apply Oops concepts for designing software applications	Apply
CO4	Understand the visualization methods , packages, statistical packages and other packages for building data models	Evaluate
CO5	Design and Analyze dataset applying statistical models, visualization and models using various tools	Analyze
CO6	Design data analytic model using the packages in python and provide inferences for multi disciplinary domains	Create/Evaluate

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title: Design and Analysis of Algorithms &Object Oriented Programming

Number of Credits: 4

Course Code: 16CSEGC05

No. of Teaching Hours: T-60 P-0

Course Objectives

To impart knowledge to make the students

1. To understand the object oriented concepts: Class, Inheritance and Polymorphism.
2. To understand and analysis concepts of Algorithmic analysis and algorithm approaches.

UNIT I

Object oriented language fundamentals – programming basics – Conditional statements – Structures – Functions - Objects and Classes – Constructors – Overloading.

UNIT II

Inheritance – Hierarchy - Derived class – Access specification - Polymorphism – virtual functions – virtual class – Files - Exception Handling.

UNIT III

Introduction to algorithms, Analyzing algorithms. Divide and Conquer: General Method, Binary Search, Merge sort, Quick sort.

UNIT IV

Greedy Method: Knapsack problem, Job sequencing with deadlines, Minimum spanning trees, Single source shortest paths. Dynamic Programming: Multistage graphs, All pairs shortest paths, Travelling salesperson problem.

UNIT V

Back Tracking: 8-queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles. Branch and Bound: General method, Travelling salesperson problem.

REFERENCES

1. BjarneStroustrup, "The C++ Programming Language", Addison Wesley, 4th Edition, 2013.
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications, 2011.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Massachusetts Institute of Technology, MIT Press, III Edition, 2009.
4. M.A.Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia,2013.
5. www.spoken-tutorial.org

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify classes and objects from the given problem description and create classes and objects using C++	Understand
CO2	code reusability and extensibility by means of Inheritance and Polymorphism	Apply
CO3	Differentiate among various algorithmic approaches	Apply
CO4	Design algorithms for problem solving by using the suitable algorithmic technique	Apply
CO5	Analyze a given algorithm for its efficiency based on time and space it occupies.	Apply
CO6	Apply optimization techniques for improving the performance of algorithms	Analyze

Course Prepared by   : Dr.T.Amudha

Course Verified by   : Dr. T. Devi

Course Title : SOFT SKILL – I **No. of Credits: 4**

Course Code : 18CSEGC06 **No. of Teaching Hours:T-30 P-30**

Course Objectives

To impart knowledge to make the students

1. To understood the basics of communication skills and soft skills
2. Acquired knowledge in technical programming and quantitative aptitude

UNIT I

Introduction to Communication – Importance – Basics of Communication – Purpose and Audience - Language as a Tool of Communication – Communicative Skills - Modes of Communication – Active Listening-Introduction - Traits of a Good Listener – Listening Modes – Effective Speaking: Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Types of Speaking

UNIT II

Personality Development: A Must for Leadership and Career Growth – Swami Vivekananda's Concept of Personality Development – Interpersonal Skills -Soft Skills: Introduction to Soft Skills – Classification of Soft Skills-Case study: Resume writing-Email-letter Writing-Self Introduction.

UNIT III

Technical programming skill: Variables and keywords - Operators in C – Decision Making– Looping - Branching Statements –Array – Functions.

UNIT IV

Quantitative Aptitude1: Number series -Ratio, Proportion and Partnership – Problems on Ages - Average - Profit and Loss.

UNIT V

Quantitative Aptitude2: Simple Interest – Compound Interest – Time and Work – Time and Distance.

REFERENCES

1. Raman Sharma, "Technical Communication", 2ndEdition, Oxford University Press 2011.
2. Barun K. Mitra"Personality Development and Soft Skills", Oxford University Press 2011.
3. Dr. Balagurusamy, "Programming in C", Tata McGraw – Hill Edition, 2008. 4. S. Chand and AshishAggarwal, "Quick Arithmetic" Sixth Revised Edition.

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understood the basics of communication skills and Develop confidence, clarity, fluency through active involvement	Understand
CO2	Understand logical skills, analytical skills and apply in software applications	Understand
CO3	Development of interpersonal skills, listening through (seminar, self intro, stage speaking)	Apply
CO4	Improve writing skills through various modes (letter writing, resume writing)	Apply
CO5	Practice technical programming , cracking code, simple logic and concepts	Remember/Analyze
CO6	Apply and solve problems of quantitative aptitude	Apply
CO7	Apply communication skills, writing Skills, logical Skills and technical skills to present himself	Evaluate

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title   : ADVANCE DATABASE MANAGEMENT   No. of Credits: 4

Course Code : 18CSEGC07   No. of Teaching Hours:T-30 P-30

Course Objectives

To impart knowledge to make the students

1) To understand the concepts of DBMS, Data Model and Normal forms.
2) To understand the concepts of concurrency control and Recovery.
3) To understand basics of SQL and NoSQL databases.
4) To understand and apply MongoDB (NoSQL) for Data Analysis using CURD and User Management.

UNIT I

Introduction - Database concepts, Basic components of DBMS, sources of data - data models – hierarchical – network – XML and Stores - Relational Database Design: Anomalies ina Database–Functional Dependency – Lossless Join and Dependency – Preserving Decomposition – Third Normal Form– BoyceCodd Normal Form –Multivalued Dependency – Fourth Normal Form – Join Dependency – Project Join Normal Form –Domain Key Normal Form - SQL: Data Definition – Data Manipulation – Integrity Constraints–Views–PL/SQL.

UNIT II

Indexing and Hashing – Query Processing – Transaction Processing – Concurrency Control and Recovery - Advanced Database Concepts and Emerging Applications: Distributed Databases – Object Oriented Databases - Object Relational Databases- Data mining and Data Warehousing – Big Data - Big Databases- SQL–NoSQL Tradeoffs–CAP Theorem–Eventual Consistency - NoSQL–database types – Document Oriented – Columnar – Graph – KeyValue Pair - NoSQL database, design for performance / quality parameters, documents and information retrieval

UNIT III

MongoDB- Introduction - MongoDb – Need – MongoDBVs RDBMS – MongoDB- Driver Installation – Configuration – Import and Export – MongoDB Server Configuration - Data Extraction Fundamentals - Intro to Tabular Formats - Parsing CSV -Parsing XLS with XLRD- Parsing XML - Intro to JSON - Getting Data into MongoDB - MongoDB- CURD – Database Creation – Update – Read – Delete

UNIT IV

Using mongoimport -Operators like $gt, $lt, $exists, $regex -Querying Arrays and using $in and $all Operators -Changing entries: $update, $set, $unset - Data Analysis - Field Queries - Projection Queries- Limiting – Sorting - - Aggregation - Examples of Aggregation Framework - The Aggregation Pipeline - Aggregation Operators: $match, $project, $unwind, $group

UNIT V

User Management – MongoDb Data Replication in Servers – Data Sharding – MongoDB Indexes – Create – Find – Drop – Backup – MongoDB – Relationships – Analyzing Queries – MongoDBObjectid - Advanced MongoDB:MapReduce – MongoDB - Text Processing - Regular Expression – Case Studies – Text processing of large datasets, Map Reduce using MongoDB

REFERENCES

1. Abraham Silberchatz, Henry K.Forth, Sudharshan, "Database system Concepts" – (6th edition), McGraw Hill, 2010.
2. Elisa Bertino, "Object Oriented Databases", Addison Wesley. 1993. 3. RamezElmasri,
3. ShamkantB.Navathe, " Fundamentals of Database Systems ", 3rd Edition, Addison Wesley-2000. 4. Malay
4. k. Pakhira, "Database Management System", Phi Learning Pvt. Ltd., 2012
5. www.spoken-tutorial.org
6. MongoDB: The Definitive Guide, 2nd Edition , Powerful and Scalable Data Storage, By Kristina Chodorow, Publisher: O'Reilly Media
7. MongoDB Basics - EelDavid Hows,Peter Membrey,coPlugge, Publisher Apress - Ebook(free) https://it-ebooks.info/book/4527/

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the structure and model of the relational database system	Understand
CO2	Design multiple tables, and using group queries	Apply
CO3	Design a database based on a data model normalization to a specified level	Analyze
CO4	Mongo DB& Operators	Apply

Course Prepared by   : Dr. S. Gavaskar

Course Verified by   : Dr. T. Devi

Course Title : OPERATIONS RESEARCH   **No. of Credits: 4**

Course Code : 18CSEGC08   **No. of Teaching Hours:T-60 P-0**

Course Objectives

   To impart knowledge to make the students

   1. To understand linear programming methods
   2. To understand Dynamic programming approach

UNIT I

Introduction to Operations Research: Basics definition - scope – objectives - phases - models - limitations of Operations Research - Linear Programming Problem - Formulation of LPP - Graphical solution of LPP - Simplex Method - Artificial variables - big-M method - two-phase method - degeneracy - nbound solutions - Introduction to optimization - gradient descent method - convex optimization.

UNIT II

BIG-M method – Two – Phase method – Special cases in the Simplex method – Transportation and Assignment Problems – Revised Simplex Method – Duality in Linear Programming Problems – Dual Simplex method – Bounded variable technique – Integer programming: Knapsack Problem – Cutting plane algorithm – Branch and bound programming – Mixed integer Programming – travelling salesperson problem.

UNIT III

Dynamic programming: Dynamic programming. Characteristics of dynamic programming – Dynamic programming approach for Priority Management employment smoothening – capital budgeting – Stage Coach/Shortest Path – cargo loading and Reliability problems.

UNIT IV

Assignment problem: Formulation – Hungarian method for optimal solution - Solving unbalanced problem – Traveling salesman problem and assignment problem.

UNIT V

Transportation problem and their applications: Transportation Problem – Formulation, solution – unbalanced Transportation problem – Finding basic feasible solutions – Northwest corner rule – least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method.

REFERENCE

   1. J K Sharma, "Operations Research Theory &Applications , 3e",Macmillan IndiaLtd,2007
   2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
   3. J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd.

4. N.V.S. Raju, "Operations Research", HI-TECH, 2002

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the Assignment problem and to optimize in engineering fields	Understand
CO2	Solve linear programming techniques to optimization problems arising in all Computer fields	Apply
CO3	Solve Integer linear programming techniques to optimization problems arising in all Computer fields	Apply
CO4	UseDynamic programming approach to real time problems.	Apply
CO5	Compare different Transportation algorithms	Understand
CO6	Write a case study using any Operations Research Methods to get optimal solution for an organization	Analyze

Course Prepared by   : Dr. T. Devi

Course Verified by   : Dr. T. Devi

Course Title : R PROGRAMMING FOR DATA ANALYTICS   No. of Credits: 4

Course Code : 18CSEGC09   No. of Teaching Hours:T-30 P-30

Course Objectives

To impart knowledge to make the students

1.To understand the basics constructs of R Programming and Visualization.
2. To understand and apply Exploring variables using Visualization.
3.To understand and apply Inferential Statistics and Regression Models.

UNIT I

Introduction:What is R–Downloading and Installing R–. **Getting Data into R:** First Step in R:Typing in Small Datasets – Concatenating Data with c Function – Combining Variables with the c, cbind, rbind Functions - Vector Function –Matrix - Ddata frame – List - Importing Excel Data – Accessing Data from other Statistical Packages – Accessing the Database. Functions - The Attach Function – Exporting Data - The Tapply Function – The Supply and Lapply Function – The Summary and Table Function.

UNIT II

Importing Data – Csv, Excel, Table, Xml, Json , Databases Conditional – Control flow – Loops – A Function with Multiple Arguments - Cleaning Data : – Exploring raw data –Missing values - Zeros and NAs – Separating – Uniting Columns - String Manipulation – Filling Missing values – Packages – R Visualization Packages – Lattice – ggplot2 – understanding plots – aesthetics - - statistical function - Histogram – Box Plot – Density Plot – Scatter Plots The Plot Function – Adding a Smoothing Line The Pie Chart – The Bar and Strip Chart – Box Plot – Cleveland Dotplots- Reporting– Data Preparation – Embedding R chunks – Labelling and reusing code chunks – Report Compiling – Configuring – R Packages – shiny - ggvis

UNIT III

Variable Analysis – One variable – Understanding outliers through – histogram , boxplot, density plot – dataset – pseudo dataset of facebook Exploring two variables – Understanding Variables and relationships – scatter plots – correlations – condition means – Explore multivariate variables – Visualization of variables using aesthetics in R – Case study – Explore Diamond dataset for prize prediciton

UNIT IV

Data types – Categorical – Binary – ordinal – Nominal – Continuous – Discrete – Data Dimensions – Univariate – bivariate – multivariate – Numerical Measures – Central Tendency – Mean – Median – Mode - Understanding data using central tendency – plotting histogram – density plots and inference of plot - Variability Measure – Variance - Range - IQC - and Standard Deviation – Sum of squares – Squared Deviations – Absolute Deviations - Identify outlier using Inter Quartile Range – Visualization using boxplot

UNIT V

Data standardizing – Z Score – Negative Z Score – Continuous Distributions - Compute proportions – Relative Frequency histogram - Normalized Distribution using Ztable – Probability Distributions - Probability of mean – location of mean distribution - Sampling Distributions —— Klout Sampling Distribution – Understanding Shape of Distribution – Standard Error - Standard Deviation of sampling distribution – Ratio of Sampling Distribution - Central Limit Theorem R – Mean of sample means Advanced Analytics Regression Analysis – Simple Regression Analysis - – Logisitc Regression – Multiple Regression ANNOVA Model

REFERENCE

1. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters,"A Beginner's Guide to R" Springer, 2009
2. Roger D. Peng, "R Programming for Data Science" Lean Publishing, 2014
3. R Data camp – Online Course Contents - https://campus.datacamp.com/courses/

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic programming structure of R– Data frame, Matrix, List, Packages and Functions	Understand
CO2	Understand various visualization models and their inference – Scatter plots, histogram, boxplot	Apply
CO3	Apply statistical functions, models and their Inferences – Central tendency measure, Range, Variance, Standard Deviation	Apply
CO4	Use data normalization for domain specific dataset	Apply
CO5	Apply distribution models , Regression models and Annova	Analyze
CO6	Design data model, visualization and inference of dataset to gain insights	Analyze/ Create

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title :DATA MINING

No. of Credits: 4

Course Code : 18CSEGC10

No. of Teaching Hours:T-60 P-0

Course Objectives

To impart knowledge to make the students

1. To understand the concepts of Data Warehouse architecture and apply for various domains.
2. Tounderstand DataMining techniques Cluster, Classification and Association Rule Mining.
3.To understand the concepts of Web mining, Text mining and Spatial mining.

UNIT I

Data warehousing: Introduction - Definition - Multidimensional data model - OLAP operations - Warehouse schema - Data warehousing architecture - Warehouse Schema - Warehouse server - Meta data - OLAP Engine - Data warehouse backend process - Data Warehouse Technology - Warehousing Software - Cloud data warehousing - Other features. Data Warehousing Case Study: Government, Tourism and Industry

UNIT II

Data mining: Introduction – Data as a Subject - Definitions- KDD vs. Data mining- DM techniques-Current Trends in Data Mining. Association Rules: Concepts- Methods to discover Association rules- A priori algorithm – Partition algorithm- Pioneer search algorithm –Dynamic Item set Counting algorithm- FP-tree growth algorithm-Incremental algorithm-Border algorithm-Generalized association rule. Analysis of association rule using orange.

UNIT III

Clustering techniques: Data Attribute Types – Data Similarity and Dissimilarity - Clustering paradigms– Partition algorithm-K- Medeoid algorithms – CLARA- CLARANS –Hierarchical DBSCAN-BIRCH- CURE-Categorical clustering algorithms-STIRR-ROCK-CACTUS-Other techniques: Implementation of Clustering techniques using orange tool.

UNIT IV

Classification Technique: Introduction – Decision Trees: Tree Construction Principle – Attributte Selection measure – Tree Pruning - Decision Tree construction Algorithm – CART – ID3 - Rainforest - CLOUDS - BOAT, Pruning Technique – Model Evaluation –Cross Validation – Bootstrap – Holdout – Classifier Performance- Boosting – AdaBoost - Bagging

UNIT V

Web mining: Basic concepts – Web content mining – Web structure mining – Web usage mining – text mining – Text Preprocessing - Text clustering – Spatial mining – Spatial mining tasks – Spatial clustering – Spatial trends – Case Studies : Big Data , IoT..

REFERENCE

1. Jiawei Han, MichelineKamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, 2012
2. Arun K Pujari, "Data Mining Techniques", Universities Press. 2012

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand data mining tools and techniques and Big Data for various domains	Remember Understand
CO2	Apply various data mining, text mining and web mining algorithms for real time applications	Apply
CO3	Analyze unsupervised and supervised algorithms for real world applications	Analyze
CO4	Illustrate the mining techniques like association, classification and clustering on datasets	Evaluate
CO5	Apply R Programming Packages for mining data	Apply
CO6	Compare various approaches of data mining algorithms	Evaluate

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title : EVOLUTIONARY COMPUTING   No. of Credits: 4

Course Code :18CSEGC11   No. of Teaching Hours:T-60 P-0

Course Objectives

To impart knowledge to make the students

1. To understand the evolutionary and heuristic technique and value representation.
2. To understand Optimization Algorithm, Genetic Algorithm and Neural Networks.
3. To understand multi-objective optimization and applications of heuristic technique.

UNIT I

Introduction to evolutionary and heuristic techniques - Principles and Historical Perspectives; Application potential in optimization, dimensionality reduction, data mining and analytics, Genetic Algorithms, Evolutionary Strategies, Evolutionary Programming

UNIT II

Introduction to Representations, Binary Strings, Real-Valued Vectors, Various Selection Strategies Introduction to Search Operators, Crossover and Mutation, Ant Colony Optimization, Pheromone mediated search and Exploration and Exploitation strategies, Particle swarm optimization basic PSO strategies and variants, different neighborhood topologies

UNIT III

Fundamentals of Artificial neural networks – Architecture – Learning Paradigms – Activation Functions - Multi-Objective optimization problem- principles of Multi-objective optimization– Dominance and pareto-optimality - Pareto Front and Non-dominated Solutions – Classical methods

UNIT IV

Biogeography Based Optimization; Immigration and Emigration Strategies, Monte Carlo Methods Simulated annealing and advanced annealing strategies, Differential Evolution, Group Search Optimization, Glow worm Optimization, Firefly and other novel heuristic algorithms

UNIT V

Applications of evolutionary & Heuristic techniques in large scale Optimization, Combinatorial & Function optimization - NSGA, Applications to large scale clustering classification, rule mining and Data driven Modeling, Variable Selection and Informative Data reduction and parameter optimization in predictive data analytics

REFERENCES

1. Kalyanmoy Deb, "Multi-Objective Optimization using Evolutionary Algorithms", John Wiley & Sons, Ltd., 2010.

2. David EGoldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, New Delhi, 2008.
3. Eiben, Smith "Introduction to Evolutionary Computing" Springer, 2010.
4. Marco Dorigo, Thomas Stutzle, "Ant Colony Optimization", MIT Press, 2010.
5. OdedMaimon, LiorRokach (Eds), "Data Mining and Knowledge discovery handbook", Springer, 2005.

Course Outcomes

On successful completion of this course students will be able to

CO1	Develop knowledge of evolutionary computation methodologies in the context of modern heuristic methods	Understand
CO2	Gain experience in matching various evolutionary computation methods and algorithms for particular classes of problems	Apply
CO3	Understand Single objective and Multi-objective optimization problems	Understand
CO4	Solve optimization problems using suitable algorithms	Analyze
CO5	Develop evolutionary algorithms for real-world applications	Apply
CO6	Explain the behavior of various heuristic algorithms and present research papers	Analyze

Course Prepared by   : Dr.T.Amudha

Course Verified by   : Dr. T. Devi

Course Title   :CLOUD COMPUTING   **No. of Credits: 4**

Course Code : 18CSEGC12   **No. of Teaching Hours:T-60 P-0**

Course Objectives

To impart knowledge to make the students

1. To understand cloud service models, architecture, programming model, security and familiarize with leading service cloud providers to critically evaluate the cloud services for business applications of various domains

UNIT I

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –- Cloud ecosystem – Service management – Computing on demand.

UNIT II

VIRTUALIZATION Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms -Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management

UNIT III

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack,

UNIT IV

Cloud Computing Providers (Usecase on any one Service Provider) - Infrastructure as a Service (IaaS) providers - Google Compute Engine, Amazon AWS, Microsoft Azure; Cloud Database providers - Google Cloud SQL, Microsoft Cloud SQL Database; Cloud Storage providers: Google Drive API, Google Cloud Storage, Azure Blob Storage.Platform as a Service (PaaS) providers for Web Rapid Application Development (RAD) - Google App Engine; Distributed Storage providers: Google Cloud Datastore, Azure tables; Distributed Computing providers and frameworks: Google Cloud Dataflow, Apache Spark –- Cloud Economics : Cloud Computing infrastructures - Cloud platform for an organization, -economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat) Domain Specific – Analysis of Case Studies - adopt cloud computing architecture

UNIT V

Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security –

Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

REFERENCES

1. Thomas Erl, "Cloud Computing: Concepts, Technology & Architecture", Prentice Hall, May 2013
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
4. GautamShroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition, [ISBN: 978- 0521137355], 2010.
5. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
6. Kumar Saurabh, " Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011
    George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
7. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
8. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer.
9. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing",Wiley – India, 2010. RajkumarBuyya, Christian Vecchiola, S.TamaraiSelvi, 'Mastering Cloud Computing", TMGH,2013.
10. www.nptl.com
11. www.Spokentutorials .com

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand Cloud Service Models and architectures	Understand
CO2	Apply the concepts of Virtualization	Apply
CO3	Understand cloud programming models	Apply
CO4	Analyze various cloud services and features of cloud service providers	Analyze
CO5	Critically analyze case studies to derive the cloud models for developing and deploying cloud based applications	Evaluate
CO6	Understand the Risks and Management of Cloud environments	Understand
CO7	Compare the cloud service models and providers to suit business needs	Analyze

Course Prepared by   :Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title : MapReduce Programming   **No. of Credits:4**

Course Code : 18CSEGC13   **No. of Teaching Hours:T-30 P-30**

Course Objectives

To impart knowledge to make the students

1. To understand MapReduce programming architecture, processing models.
2. To understand and design MapReduce Programming using PIG and Hive
3. To understand and compare the architectural and processing of MapReduce Programing languages Pig, Hive and SPARK

UNIT I

Introduction to Big Data – Distributed file system –, Map Reduce Algorithm- Hadoop Storage [HDFS], Common Hadoop Shell commands - Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode - Hadoop Configuration – SPARK Configuration - Pig Configuration – Hive Configuration –

UNIT II

Pig Introduction : Overview of Pig - Pig Architecture - Pig Execution modes, Pig Grunt shell and Shell -commands. Pig Latin Basis: Data model, Data Types, Operator - Pig Latin Commands - Load & Store, Diagnostic Operators, Grouping, Cogroup, Joining, Filtering, Sorting, Splitting - Built-In Functions, User define functions.- Pig Execution Modes – Batch Mode – Embedded Mode – Pig Execution in Batch Mode – Embedding Pig in Python – Use cases - Map Reduce programs with Pig – Pig Vs SQL

Unit III

Introduction of Hive - Hive Features - Hive architecture -Hive Meta store - Hive data types – Hive Tables - Table types - Creating database , Altering database, Create table, alter table, Drop table, - Built-In Functions - Built-In Operators, User defined functions, - View – Pig Vs Hive

UNIT IV

HiveQL–Introduction to HiveQL, HiveQL Select, HiveQL – MapReduce using HiveQLOrderBy,Group By Joins, LIMIT, Distribute By , Cluster By - Sorting And Aggregation – Partitioning – Static –Dynamic – Index Creation - Bucketing – Analysis of MapReduce execution – Hive Optimization – Setting Hiivng Parameters. – Usecase :MapReduce using Hive QL – HiveQLVs SQL

UNIT V

SPARK – MapReduce - RDD Transformations – SPARK Operations – Usecase with SPARK and Comparison - MapReduce – Python – R – Pig – Spark – Hadoop - Limitations – Advantage – SPARK vsHadoop – SPARK Vs Pig and Hive – MapReduce

REFERENCES

1. Boris Lublinsky Kevin T. Smith Alexey Yakubovich ,ProfessionalHadoop® Solutions, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.
3. Tom White ,"Hadoop: The Definitive Guide", O'Reilly Media 3rd Edition,May6, 2012
4. Donald Miner, Adam Shook, "MapReduce Design Patterns", O'Reilly Media November 22, 2012
5. Edward Capriolo ,DeanWampler ,Jason Rutherglen, "Programming Hive", O'Reilly Media; 1 edition , October, 2012
6. Alan Gates , "Programming Pig", O'Reilly Media; 1st Edition ,October, 2011
7. https://www.tutorialspoint.com/apache_spark

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand MapReduce Processing architectures	Understand
CO2	Configure and setup MapReduce Processing architectures Ecosystem – Hadoop, Spark , Pig and Hive	Apply
CO3	Understand and write MapReduce program using Pig and Hive, spark	Apply
CO4	Analyze dataset using Pig and Hive	Analyze
CO5	Critically analyze case studies for and suggest MapReduce Programming models based on domains and applications	Evaluate
CO6	Distinguish Hadoop and SPARK	Analyze
CO7	Design and setup a Big Data Analytics Ecosystem for specific Business scenarios	Evaluate

Course Prepared by : Dr.V.Bhuvaneswari

Course Verified by : Dr. T. Devi

Course Title   : Machine Learning

No. of Credits:4

Course Code : 18CSEGC14

No. of Teaching Hours:T-30 P-30

Course Objectives

To impart knowledge to make the students

1. To understand the concepts of machine learning concepts, algorithms, and probabilistic, linear, graphical models.
2. To apply the machine learning algorithms for various applications.

UNIT I

Introduction : Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning - Applications - Linear Models for Regression - Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison

UNIT II

Supervised Learning Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks -Feed-forward Network Functions - Error Backpropagation - Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks. Support Vector Machines - Ensemble methods- Bagging- Boosting – Evaluation Methods

UNIT III

Unsupervised Learning Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model selection for latent variable models - high-dimensional spaces -- The Curse of Dimensionality -Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA- Independent components analysis

UNIT IV

Probabilistic Graphical Models Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs -Examples -Markov Random Fields - Inference in Graphical Models - Learning –Naive Bayes classifiers-Markov Models – Hidden Markov Models – decoding states from observations, learning HMM parameters-Inference – Learning Generalization – Undirected graphical models- Markov random fields- Conditional independence properties - Parameterization of MRFs - Examples - Learning - Conditional random fields (CRFs) - Structural SVMs

UNIT V

Advanced Learning   Sampling – Basic sampling methods – Monte Carlo. Reinforcement Learning- K-Armed BanditElements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning Exploration Strategies- Deterministic and Non-deterministic Rewards and Actions- Eligibility Traces - Generalization- Partially Observable States- The Setting- Example. Semi - Supervised Learning. Computational Learning Theory - Mistake bound analysis, sample complexity analysis,

REFERENCES

1. Christopher Bishop, "Pattern Recognition and Machine Learning" Springer, 2006
2. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012
3. EthemAlpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014
4.Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education, 2013.
5. Hastie, Tibshirani, Friedman, "The Elements of Statistical Learning" (2nd ed)., Springer, 2008
6. Stephen Marsland, "Machine Learning –An Algorithmic Perspective", CRC Press, 2009
7.www.swayam.com

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand the concepts of machine learning	Understand
CO2	Understand the theoretical concepts of probabilistic and linear methods	Remember
CO3	Distinguish Supervised, Unsupervised and semi supervised learning	Analyze
CO4	Understand and Apply the algorithms for a given specific problem in a specific tool	Apply
CO5	Suggest Supervised, Unsupervised and semi supervised algorithms for specific application	Analyze
CO6	Design a Machine Learning system for any specific domain	Evaluate

Course Prepared by   : Dr.V.Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title : Soft Skills - II

No. of Credits:4

Course Code : 18CSEGC15

No. of Teaching Hours:T-30 P-30

Course Objectives

To impart knowledge to make the students

1. To understand the basics of verbal and non-verbal reasoning, technical programming skills using C++,
2. To acquired knowledge of using soft skills and the interview-based topics in DBMS and Computer Networks.

UNIT I

Verbal Reasoning: General Mental Ability-Coding-Decoding-Blood Relation-Logical Venn Diagram- Mathematical Operations - Arithmetical Reasoning - Truth statement.

UNIT II

Non-Verbal Reasoning-Series-Choosing the Missing Figure in a Series-Detecting the IncorrectOrder-Detecting the Wrong Figure-Analytical Reasoning-Rule Detection-Construction of Boxes-Figure Formation and Analysis -Formation of a Figure from Parts-Formation of a Figure Fragmentation-Identical Figure-Pattern Rearrangement

UNIT III

Technical skill: Concepts of OOPS-Object and Classes - Inheritance – Polymorphism – Data Hiding– Virtual Function - Operator Overloading – Function Overloading

UNIT IV

Interviews, Group Discussions, Presentation Skills, Conversation: Effective Presentation StrategiesPlanning-Nuances of Delivery- Controlling Nervousness and Stage Fright-Visual Aids in Presentations- Job Interviews-Media Interviews- Communication-Group Discussions-GD as Part of a Selection Process.

UNIT V

Theoretical Concepts – DBMS: Keys-Normalization-RDBMS-Concurrency ControlSoftware Engineering: Models-Design Strategies – Testing-OperatingSystem – Process-Memory Management – Paging-Dead Lock-Virtual Memory-ComputerNetworks – OSI-TCP/IP-Communication Modes-N/W Devices.

REFERENCES

1. Dr. R. S. Aggarwal and S. Chand"A Modern Approach to Verbal & Non-Verbal Reasoning" Revised Edition
2. Dr. Balagurusamy," Object Oriented Proramming with C++" Tata McGraw-Hill Edition, 2008 3. Raman Sharma, "Technical Communication-Principles and Practices", Second Edition

Course Outcomes

On successful completion of the course, students will be able to

CO1	To understand the basics of mental ability, logical ability through active involvement	Understand
CO2	To understand analytical reasoning and apply in software applications	Understand
CO3	To development of programming and database management skills	Apply
CO4	To improve Presentation Skills, Controlling Nervousness and Stage Fright, Communication via Group Discussions	Apply
CO5	To practice technical programming, cracking code, simple logic and concepts	Remember/ Analyze

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title: Internet of Things and   **No. of Credits:4**
                     Wireless Sensor Networks
Course Code : 18CSEGE01   **No. of Teaching Hours:T-30 P-30**

Course Objectives

To impart knowledge to make the students

1. To understand the concepts of micro controller
2. To apply IoT Applications for specific domains
3. To understand the Programming Fundamentals with C using Arduino

UNIT I

Introduction and definition to IOT - What is an IOT? - Explore the scenario for application of IOT Communication definitions Concepts - Capturing and Storing the data - What to do with the data…applying Expert Systems and Machine Learning; IOT Detailed understanding of Solution Architecture - IOT Device Architecture - IOT Network/Communication Architecture with an understanding on client server and looselycouple storage servers and message queues - IOT Application Architecture.

UNIT II

Programming Fundamentals with C using Arduino IDE - Understanding the Arduino IDE - Installing and Setting up the Arduino IDE - Connecting the Arduino IDE with devices - Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops -Functions , Array and Pointers - Strings and I/O -Using Arduino C Library functions for Serial, delay and other invoking functions - Working with LED and Switch example on Arduino C Library functions –

UNIT III

Working with Arduino for data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding basic electronic components and power elements - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor - Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor - Working with Proximity Sensor - Working with Photo Diode - Working with Accelerometer and vibration sensor - Measuring Voltage and Current–

UNIT IV

Working with Arduino for data acquisition with IOT Devices - Understanding the Outputs - Activating LED Lights - Activating Relays - Activating Buzzer - Running DC Motors - Running - Stepper Motors and Servo Motors

UNIT V

Programming Fundamentals with Web Applications for handling Data Communication from IOT Device - Understanding the data capture through web services - Creating and Programming a rest

web service with ASP.NET / PHP - Calling and accessing the Web Service in a Client; Building and Using Communication Devices to data transfer from IOT Devices - Understanding the Communication Principles to Transfer the data from IOT Devices; Remote Communication to cloud/external application - Using WIFI to Transfer the data from IOT Sensor.

REFERENCES

1. Michael Margolis, "Arduino Cookbook" 2nd Edition, O'Reilly Media, 2011
2. Michael Collier, Robin Shahan, "Fundamentals of Azure", Microsoft Press, 2015, ISBN: 978-0-7356-9722-5
3. Rick Rainey, "Azure Web Apps for Developers", Microsoft Press, 2015, ISBN: 978-1-5093-0059-4
4. Microsoft Azure, "Introduction to Microsoft Azure Storage", https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction

Course Outcomes

On successful completion of the course, students will be able to

CO1	To understand the basics of mental ability, logical ability through active involvement	Understand
CO2	To understand analytical reasoning and apply in software applications	Understand
CO3	To development of programming and database management skills	Apply
CO4	To improve Presentation Skills, Controlling Nervousness and Stage Fright, Communication via Group Discussions	Apply
CO5	To practice technical programming, cracking code, simple logic and concepts	Remember/ Analyze

Course Prepared by   : Dr. R. Rajeswari

Course Verified by   : Dr. T. Devi

Course Title :TEXT ANALYTICS

No. of Credits: 4

Course Code : 18CSEGE02

No. of Teaching Hours:T-60 P-0

Course Objectives

To impart knowledge to make the students

1. To understand the knowledge of text mining and pre-processing techniques
2. To understand and apply the data mining classification techniques
3. To understand and apply Probabilistic Model for text mining
4. To apply the text mining approaches with case studies

UNIT I

Text Mining - Definition-General Architecture–Algorithms– **Core Operations** : Distributions-Frequentand near Frequent Sets- Associations – Isolation of Interesting Patterns – Analyzing Document Collection over Time – Using Background Knowledge for text mining–**Pre-processing**-Textual information to numerical vectors -Collecting documents-document standardization-tokenization-lemmatization-vector generation for prediction-sentence boundary determination -evaluation performance

UNIT II

TEXT CATEGORIZATION AND CLUSTERING
Text Categorization –Definition –Document Representation – Feature Selection -Decision Tree Classifiers -Rule- based Classifiers - Probabilistic and Naive Bayes Classifiers - Linear Classifiers-Classification of Linked and Web Data - Meta-Algorithms–Clustering –Definition-Vector Space Models - Distance-based Algorithms-Word and Phrase-based Clustering -Semi-Supervised Clustering -Transfer Learning

UNIT III

TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION
Information retrieval and text mining-keyword search-nearest -neighbor methods-similarity-web-based document search-matching-inverted lists-evaluation. Information extraction-Architecture -Co-reference - Named Entity and Relation Extraction-Template filling and database construction –Applications.Inductive -Unsupervised Algorithms for Information Extraction. Text Summarization Techniques -Topic Representation -Influence of Context -Indicator representations -Pattern Extraction -Apriori Algorithm – FP Tree algorithm

UNIT IV

PROBABILISTIC MODELS
Probabilistic Models for Text Mining -Mixture Models -Stochastic Processes in Bayesian Nonparametric Models -Graphical Models -Relationship Between Clustering, Dimension Reduction and Topic Modeling -Latent Semantic Indexing -Probabilistic Latent Semantic Indexing -Latent Dirichlet Allocation-Interpretation and Evaluation -Probabilistic Document

Clustering and Topic Models -Probabilistic Models for Information Extraction -Hidden Markov Models -Stochastic Context-Free Grammars - Maximal Entropy Modeling -Maximal Entropy Markov Models -Conditional Random Fields

UNIT V

VISUALIZATION METHODS AND TEXT MINING APPLICATIONS

Visualization Approaches -Architectural Considerations –Common Visualization Approaches for text mining -Example-Mining Text Streams -Text Analytics in Social Media -Opinion Mining and Sentiment Analysis -Document Sentiment Classification - Opinion Spam Detection –Text Mining Applications and Case studies

REFERENCES

1. Sholom Weiss, Nitin Indurkhya, Tong Zhang, Fred Damerau "The Text MiningHandbook:Advanced Approaches in Analyzing Unstructured Data,", Springer, paperback 2010
2. Ronen Feldman, James Sanger-"The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data"-Cambridge University press, 2006.
3. Charu C. Aggarwal ,ChengXiangZhai,Mining Text Data, Springer; 2012 .

Course Outcome

On successful completion of the course, students will be able to

CO1	Understand the basic issues of and types of text mining	Understand
CO2	Appreciate the different aspects of text categorization and clustering	Apply
CO3	Understand the role played by text mining in information retrieval extraction	Understand
CO4	Apply the probabilistic models, clustering and classification for text mining	Apply
CO5	Analyze the currents trends in text mining	Analyze
CO6	Design a text analytic framework to analyse text data for specific domain	Apply

Course Prepared by   : Dr. V. Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title　:Data Visualization　　　　　　　**No. of Credits:4**

Course Code　: 18CSEGE03　　　　　　　**No. of Teaching Hours:T-30 P-30**

Course Objectives

　　To impart knowledge to make the students

　　　1. To understand how accurately represent voluminous complex data set in web and from other data sources
　　　2. To understand the methodologies used to visualize large data sets
　　　3. To know how to work with visualization tools.

UNIT I

INTRODUCTION: Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools. **VISUALIZING DATA METHODS:** Mapping - Time series - Connections and correlations - Scatter plot maps - Trees, Hierarchies and Recursion - Networks and Graphs, Info graphics.

UNIT II

INTERACTIVE DATA VISUALIZATION: Introduction to D3 **-** Fundamental Technology - Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geomapping – Exporting- **Data to create Visualizationwith SVG** - SVG – Styling CSS – Shapes – SVG Properties – SVG Text - Drawing – Transformations – Building Chart with SVG (Scalable Vector Graphics) - Shaping Web Pages – Selections – Attributes – Chaining Methods –Data Joins - Sizing – scales – axes – Loading – Filtering – Interactive Charts – Buttons using Data Join – Transition using Key

UNIT III

D3-BASED REUSABLE CHART LIBRARY: Introduction to D3 – Setup and Deployment – Generate Chart – Customize Chart – How to Use APIs – Customize Style – Building Real time and Live Updating animated graphs with C3.

UNIT IV

TABLEAUE INTRODUCTION: Environment Setup – Navigation – File & Data Types. **DATA SOURCE:** Custom Data View – Extracting Data – Fields Operations – Editing Meta Data – Data Joining – Data Blending. Worksheets

UNIT V

 TABLEAUE CHARTS: Bar Chart – Line Chart – Pie Chart – Scatter Plot – Bubble Chart – Gantt Chart – Histograms - Waterfall Charts. **ADVANCED:** Dashboard – Formatting – Forecasting – Trend Lines

REFERENCES

1. Ben Fry, "Visualizing Data", O"Reilly Media, Inc., 2007.
2. Scott Murray, "Interactive data visualization for the web", O"Reilly Media, Inc., 2013.
3. Ritchie S. King - Visual Storytelling with D3 – An Introduction to Data Visualization with D3, Addison-Wesley- *Data Analytic Series,* ISBN 10: 0321933176
4. Elijah Meeks , D3.js in Action, Second Edition: Data visualization with JavaScript, Publisher: Manning Publications, 2017 , ISBN: 9781617294488
5. http://c3js.org/gettingstarted.html
6. https://www.tutorialspoint.com/tableau/index.htm
7. https://www.tableau.com/learn/training.
8. https://www.dashingd3js.com/table-of-contents
9. WWW.udacity.com-Data Visualization and D3.J

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand the concepts of visualization	Understand
CO2	Understand the methods for visualizing data in D3j, c3j, and Tableau	Remember
CO3	Apply Visualization methods for different data domains	Analyze
CO4	Design Interactive Charts based on Data	Apply
CO5	Distinguish and Suggest the appropriate data visualization tools for domain specific applications	Analyze
CO6	Design an Interactive data visualization story board for data	Evaluate

Course Prepared by : Dr.V.Bhuvaneswari

Course Verified by : Dr. T. Devi

Course Title: Social Media Mining   **No. of Credits:4**

Course Code : 18CSEGE04   **No. of Teaching Hours:T-60 P-0**

Course Objectives

To impart knowledge to make the students

1. To understand how accurately analyze voluminous complex data set in social media and other sources
2. To understand the models and algorithms to process large data sets
3. To understand social behaviour and recommendation challenges and methodologies

UNIT I

Social Media Mining - Introduction – Atoms – Molecules – Interactions – Social Media mining Challenges -   Graphs - Basics – Nodes – Edges – Degree of Distribution- Types –Directed – Undirected – Weighted - Graph Connectivity - Tress and Forests – Bipartite graphs – Complete Graphs – Sub graphs – Planar Graphs - Graph Representation - Graph Traversal Algorithms – Shortest path algorithms Dijkstra's - Spanning tree algorithms – Prims - Bipartite matching - Ford-Fulkerson algorithm

UNIT II

Network Models – Measures – Node : Eigen Centrality – Page Rank – Group Measures – Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity -   Linking Analysis - Cluster coefficient – Jaccard - Case Study : -Modeling small networks with real world model

UNITIII

Social media Communities – Social Communities – Member based Detection – Node degree – Node Similarity – Node reachability - Group Based detection methods - balanced – robust - modular – dense - hierarchical - Spectral Clustering : Balanced Community algorithm Community Evolution - Evaluation.

UNITIV

Social Network – Information Diffusion – Types - herd behavior - information cascades diffusion of innovation – epidemics – Diffusion Models Case Study – Herd Behavior – Information Cascades Methods – Social Similarity – assortativity – Social Forces - Influence homophily – Confounding - Assortativity measures – Influence measures – Predictive Models

UNITV

Recommendation Vs Search – Recommendation Challenges – Recommender algorithms - Content-Based Methods- Collaborative Filtering – Memory Based – Model Based – Social Media Recommendation – User friendship – Recommendation Evaluation – Precision – Recall –

Behavioral– User Behavior – User – Community behavior – User Entity behavior – Behavioral Analytics - Methodology

REFERENCES

1. Social Media Mining: An Introduction – Reza Zafarani , MohhammadAbiElasi – Published by Cambridge press, 2014 – (Free Ebook available http://dmml.asu.edu/smm/chapter**)**
2. Data Mining for Social Network Data- Memon, N., Xu, J.J., Hicks, D.L., Chen, H. (Eds.), Springer – Annals of Information Systems ,ISBN 978-1-4419-6287-4

Course Outcomes

On successful completion of the course, students will be able to

CO1	Understand the concepts of Graph Models, social communities	Understand
CO2	Understand the network models and measures to evaluate information	Remember
CO3	Understand and apply algorithms to model data using graph and network structures and recommendations	Analyze
CO4	Brief on algorithms on social data diffusion and apply for various domains	Apply
CO5	Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion	Analyze
CO6	Evaluate the algorithms for metrics	Evaluate

Course Prepared by   : Dr.V.Bhuvaneswari

Course Verified by   : Dr. T. Devi

Course Title : Sentiment Analysis

No. of Credits:4

Course Code : 18CSEGE05

No. of Teaching Hours:T-60 P-0

Course Objectives

To impart knowledge to make the students

1. Main objective of this course is to understand and practice on sentiment analysis from the source material (usually from text), by classifying the user conversation and extracts the opinions of subjective information using advanced tools and algorithms.

UNIT I

Sentiment Analysis Applications: Sentiment Analysis Research - Opinion Spam Detection. The Problem of Sentiment Analysis: Problem Definitions - Opinion Summarization - Different Types of Opinions - Subjectivity and Emotion - Author and Reader Standing Point. Document Sentiment Classification: Sentiment Classification Using Supervised Learning - Sentiment Classification Using Unsupervised Learning - Sentiment Rating Prediction - Cross-Domain Sentiment Classification - Cross-Language Sentiment Classification.

UNITII

Sentence Subjectivity and Sentiment Classification: Subjectivity Classification - Sentence Sentiment Classification - Dealing with Conditional Sentences - Dealing with Sarcastic Sentences - Cross-language Subjectivity and Sentiment Classification - Using Discourse Information for Sentiment Classification.

UNITIII

Aspect-based Sentiment Analysis: Aspect Sentiment Classification - Basic Rules of Opinions and Compositional Semantics - Aspect Extraction - Identifying Resource Usage Aspect - Simultaneous Opinion Lexicon Expansion and Aspect. Extraction: Grouping Aspects into Categories - Entity, Opinion Holder and Time Extraction - Co reference Resolution and Word Sense Disambiguation.

UNIT IV

Sentiment Lexicon Generation: Dictionary-based Approach - Corpus-based Approach - Desirable and Undesirable Facts. Opinion Summarization: Aspect-based Opinion Summarization - Improvements to Aspect-based Opinion Summarization - Contrastive View Summarization - Traditional Summarization Analysis of Comparative Opinions: Problem Definitions - Identify Comparative Sentences - Identifying Preferred Entities .

UNIT V

Opinion Search and Retrieval: Web Search vs. Opinion Search - Existing Opinion Retrieval Techniques Opinion Spam Detection: Types of Spam and Spamming - Supervised Spam Detection - Unsupervised Spam Detection - Group Spam Detection.

REFERENCES

1. Sentiment Analysis and Opinion Mining (Synthesis Lectures on Human Language Technologies), Bing Liu, Morgan & Claypool Publishers (2012)
2. Sentiment Analysis: Mining Opinions, Sentiments, and Emotions, Bing Liu, Cambridge University Press (2015)
3. http://nptel.ac.in/courses/106105158/61
4. Sentiment Analysis: Second Edition, GerardusBlokdyk ,Createspace Independent Publishing Platform (2018)

Course outcomes

On successful completion of the course, students will be able to

CO1	The sources of user conversation, document types, identification of human emotions and design the methods to extract and classifying the content	Understand
CO2	Design and prepare the sources of sentiment analysis problem, with expected input and output specification.	Remember and Analyze
CO3	Prepare and Apply the program using supervised and unsepervised learning, using a OSS tool	Apply and Evaluate
CO4	Evaluate the opinion summarization and lexicon generation	Evaluate
CO5	Design and prepare the sources of opinion summarization problem, with expected input and output specification.	Remember and analyze
CO6	Prepare and Apply the code for the opinion summarization using algorithms in a OS tool.	Apply and Evaluate

Course Prepared by   : Mr.S.Palanisamy

Course Verified by   : Dr. T. Devi

Course Title   : Progressive Web Application Development   No. of Credits: 4

Course Code : 18CSEGE06   No. of Teaching Hours: T-30, P-30

UNIT I
PWA and Angular 2 -What is a Progressive Web App (PWA)? - Features of Progressive Web App (PWA) - Different PWA Platforms; What is Angular 2 - Angular 2 Architecture - Angular 2 features; Install Node.js server - Install Git hub - Install Typescript - Install Angular 2 - Install Angular CLI; Working with Angular CLI features - Creating an Angular Project - Creating component - Creating a module - Creating a service - Creating pipes - Creating directive - Creating Enum

UNIT II
Components-What is a Component made of? - Working with the component HTML and Style Sheet - Working with component type script code - Understanding typescript basics - Adding the component to the module; Understanding and working with flex layout - Installing the Flex Layout - Building and working with different Layouts; Install and implement Angular Material components - Adding a Material UI component to angular component - Working with Angular Material UI Elements - Working with Material icons

UNIT III
Events -How are events implemented in angular code? - Understanding component life cycle events - Responding to common component UI events; Understanding the structure of the component class - Defining the properties and variables - Understanding Data binding - Defining the methods - Defining and understanding @Input - Defining and understating the @Output

UNIT IV
Understanding Directives - Working with ngIf - Working with ngFor - Understanding Pipes - Implementing a simple pipe for a date substitution - Creating custom Pipes; Understanding Navigation in Angular 2 - How is router enabled? - Understanding the base routing? - Working with router outlet - Understanding router events; What is MVC/ Web API? - How to create an MVC application with Microsoft Visual Studio? - How to create an entity to show json output? - Creating and running the MVC Service

UNIT V
Understanding HTTP Service - Understanding and Working g with Dependency Injection - Calling an MVC Service with HTTP Service - Handling Json Data from MVC and binding the data; How is code reusability ensured in Angular 2? - Building custom services - Building module to integrate component - Building components into parents to facilitate interaction; How to build custom service? - How to add the service to a module? - Calling a service inside a component; Understanding web hosting? - Understanding angular build environment - How to build the production code? - Deployment of the production code to web site

REFERENCES
1. Jake Spurlock, 'Bootstrap', O'Reilly Media, 2013
2. Alex Pop, 'Learning AngularJS for .NET Developers', Packt Publishing Ltd., 2014.
3. Rajesh Gunasundaram, 'Learning Angular 4 for .NET Developers', Packt Publishing Ltd., 2017
4. www.pluralsight.com