ALAGAPPA UNIVERSITY

(A State University Established in 1985)
Karaikudi - 630003, Tamil Nadu, India

2017	2018	2018	2019	2019
Accredited with A+ Grade by NAAC (CGPA : 3.64)	MHRD Govt. of India — UGC University Grants Commission — Graded as Category - 1 & Granted Autonomy	MHRD GOVERNMENT OF INDIA — Swachh Campus Rank : 4	nirf NATIONAL INSTITUTIONAL RANKING FRAMEWORK — Rank : 26	QS — India Rank : 20 BRICS Rank : 104 Asia Rank : 216

DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

[Choice Based Credit System (CBCS)]
[For the candidates admitted from the academic year 2019 -2020]

PROGRAMME: M.Sc. COMPUTER SCIENCE

Programme General Objectives

In this Era, computers are almost used in all domains. The Master of computer science Programme aims to improve the knowledge of the students with a scientific mindset having technical knowledge to analyze, design, validate and implement state of the art techniques for solving real world problems. The Programme enables students to build with fundamental knowledge and mastery in the areas of Computer Science and its applications.

Programme Specific Objectives

1. Demonstrate proficiency in the analysis of complex problems and the synthesis of solutions to those problems with the help of computers
2. Understand and use the modern software engineering principles
3. Acquire broad understanding of database concepts and database managements system software and Emerging Trends in it.
4. Learn the phases of compiler and explore knowledge about context free grammars, compiler parsing techniques, syntax directed definitions and translation scheme.
5. To understand necessary approaches and techniques to build protection mechanisms in order to secure personal information and computer networks.
6. Learning basic and advanced methods to big data technology and tools, including MapReduce, Hadoop and its ecosystem.
7. Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

Programme Outcome

On Successful Completion of the Programme, the students

1. Possess an explorative knowledge in computer field with technical and programming skill sets.
2. Possess theoretical knowledge and practiccal experience in current and emergency fields in computer science.
3. Exhibit enough technical skills to solve real world problems using computational knowledge
4. Emerge as software professional playing/serving different roles in computer science domains
5. Become an Entrepreneur in IT industry.

Regulations (2019-2020)

1. Candidates for admission to the first year of the Master of Science in Computer Science [M.Sc. (Computer Science)]programme is required to pass in any one of the following Examinations of any recognized University with a minimum of 55% marks in Part-III (minimum 50% marks for SC/ST candidates):

   B.Sc. Degree in Computer Science/Information Technology/Electronics or B.C.A. or any qualification equivalent thereto in 10+2+3 pattern.

2. The M.Sc. (Computer Science) programme is a two year programme consisting of four semesters. Each semester consists of minimum of 75 working days at the rate of 6 hours per day.

3. The courses of study and the scheme of examinations are shown in Appendix A.

4. The End-Semester Examinations are conducted in November and April of every academic year by the University in different courses according to the scheme given in Appendix A. A candidate is permitted to appear for the End-Semester Examination in a particular course at the end of each semester provided he/she secures not less than 75% of attendance in each course in that semester.
5. The revised curriculum is offered from the academic year 2019-2020.
6. Each student should take 90 credits to complete M.Sc. (Computer Science) Programme.
7. a) Each student is allowed to take elective courses from list offered to fulfill the courses of study.
   b) Students are allowed to take interdisciplinary courses in a semester from the interdisciplinary courses offered by the Department and other Departments as suggested by the advisory staff.
8. Each student has to register for at least 4 credits in the interdisciplinary courses. The number of credits so registered should not exceed 8 credits for the entire period of study.
9. Each theory course carries 4 credits with 75 marks in the Semester (University) Examination and 25 marks in the Internal Assessment and each Lab (Practical) course carries 2 credits with 60 marks in the Semester Examination and 40 marks in the Internal Assessment.
10. The Semester Examinations are conducted for three hours' duration.
11. The project work shall span for a period of one semester duration. The students have to submit a project report at the end of IV Semester. It carries 18 credits with 150 marks in the End-Semester Examination (50 marks for Project Evaluation by External Examiner and 100 marks for viva-voce jointly awarded by both Internal and External Examiners) and 50 marks in the Internal Assessment (Project monitoring and Evaluation by the Internal Examiner).
12. To pass in each course, a candidate is required to secure 40% marks in the Semester Examination and 40% marks in the Internal assessment and 50% marks in the aggregate (marks in Semester Examination + marks in Internal Assessment).
13. A student is permitted to continue the Programme from I to IV semesters irrespective of failure(s) in the courses of the earlier semesters. The candidate will qualify for the M.Sc. (Computer Science) degree only if the student passes all the prescribed courses of the Programme with in a period of FOUR years.
14. Results will be declared after the completion of each Semester Examination and the marks/grades obtained by the candidate will be forwarded to them through the Head of the Department.
   a) A Candidate who has passed all the examinations in the first attempt within two years of admission shall be declared to have passed in First Class with Distinction provided the candidate secures more than 75% marks in the aggregate

   b) A candidate who has passed all the examinations within two years of admission shall be declared to have passed in First Class provided he/she secures not less than 60% marks in the aggregate.
15. All courses in all Examinations shall be eligible for the award of the Degree of Master of Science in Computer Science [M.Sc. (Computer Science)].
16. The common CBCS regulations prescribed for the Departments by the Alagappa University will be followed in all respect.

DEPARTMENT OF COMPUTER SCIENCE

(A State University Established in 1985)

KARAIKUDI - 630 003, Tamil Nadu, India

M.Sc – computer science

SYLLABUS CREDIT STRUCTURE FOR M.Sc PROGRAMME

Semester	Course / Title	Course Code	Credit	Hour/Week	Marks		Total
					Internal	External	
I	DESIGN AND ANALYSIS OF ALGORITHMS(cc)	551101	4	4	25	75	100
	ADVANCED WEB TECHNOLOGY(cc)	551102	4	4	25	75	100
	ADVANCED DATABASE MANAGEMENT SYSTEMS(cc)	551103	4	4	25	75	100
	COMPILER DESIGN(cc)	551104	4	4	25	75	100
	ALGORITHM-LAB	551105	2	4	25	75	100
	ADVANCED WEB TECHNOLOGY	551106	2	4	25	75	100
	LIBRARY/YOGA/CAREER		-	2	-	-	-
	Elective-I ADVANCED COMPUTER NETWORKS(EC)	551551	4	4	25	75	100
	OBJECT ORIENTED SYSTEM DEVELOPMENT(EC)	551552	-	-	-	-	-
	DOT NET PROGRAMMING(EC)	551553	-	-	-	-	-
	OPTIMIZATION TECHNIQUES(EC)	551554	-	-	-	-	-
	Total		24	30	175	525	700
II	DISTRIBUTED OPERATING SYSTEM(CC)	551201	4	4	25	75	100
	ADVANCED JAVA PROGRAMMING(CC)	551202	4	4	25	75	100
	CRYPTOGRAPHY AND NETWORK SECURITY(CC)	551203	4	4	25	75	100
	OPERATING SYSTEM AND ADVANCED JAVA LAB	551204	3	6	25	75	100
	SWAYAM/MOOCS 01		-	EXTRA CREDIT	-	-	-
	LIBRARY/YOGA/CAREER GUIDANCE		-	1	-	-	-
	Elective – II WIRELESS NETWORKS(EC)	551555	4	4	25	75	100
	SOFTWARE ARCHITECTURE(EC)	551556	-	-	-	-	-
	EMBEDDED SYSTEMS(EC)	551557	-	-	-	-	-

	Subject	Code					
	STATISTICAL COMPUTING(EC)	551558	-	-	-	-	-
	Elective – III ADVANCED DATA MINING TECHNIQUES(EC)	551559	4	4	25	75	100
	SOFTWARE PROJECT MANAGEMENT(EC)	551560	-	-	-	-	-
	WEB SERVICES(EC)	551561	-	-	-	-	-
	WAP AND XML(EC)	551562	-	-	-	-	-
	NON-MAJOR ELECTIVE 1		2	3	25	75	100
	Total		**25**	**30**	**175**	**525**	**700**
III	DIGITAL IMAGE PROCESSING(CC)	551301	4	4	25	75	100
	INTERNET OF THINGS(CC)	551302	4	4	25	75	100
	MACHINE LEARNING(CC)	551303	4	4	25	75	100
	Elective-IV CLOUD COMPUTING(EC)	551563	4	4	25	75	100
	PRINCIPLES OF SOFT COMPUTING (EC)	551564	-	-	-	-	-
	DATA SCIENCE AND BIG DATA ANALYTICS(EC)	551565	-	-	-	-	-
	WEB MINING(EC)	551566	-	-	-	-	-
	IMAGE PROCESSING AND MACHINE LEARNING-LAB	551304	4	4	25	75	100
	Elective-V MOBILE COMPUTING AND GREEN IT(EC)	551567	3	6	25	25	100
	HIGH PERFORMANCE COMPUTING(EC)	551568	-	-	-	-	-
	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS(EC)	551569	-	-	-	-	-
	CYBER SECURITY AND FORENSICS(EC)	551570	-	-	-	-	-
	NON-MAJOR ELECTIVE 2		2	3	25	75	100
	SWAYAM/MOOC$_S$ 02		-	EXTRA CREDIT	-	-	-
	LIBRARY / YOGA/ CAREER GUIDANCE		-	1	-	-	-
	Total		**25**	**30**	175	525	**700**
	INDUSTRIAL TRAINING	551888	1	-	25	25	50
	DISSERTATION AND VIVA VOICE(INDUSTRY/RESEARCH)	551999	15	-	50	100	150
	Total		**22**	**-**	**75**	**125**	**200**
	Grand Total		**90**		**-**	**-**	**2300**

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CC: Core Course, **EC**: Elective Course, **NME**: Non Major Elective Course, **SLC**: Self Learning Course (MOOCs) and **NEC**: Non Exam Course.*Credits earned through Self Learning Courses (MOOCs) shall be transferred in the credit plan of the program as extra credits.

Semester	Course / Title	Course Code	Credit	Hours/ Week	Internal	External	Total
II	NON-MAJOR ELECTIVE 1		2	3	25	75	100
III	NON-MAJOR ELECTIVE 2		2	3	25	75	100

Semester- I				
Course Code:551101	**DESIGN AND ANALYSIS OF ALGORITHMS**		**Credits:5**	**Hours: 5**
Objectives	➢ Learn various problem solving techniques through Computing. ➢ Deriving computational complexity of algorithms.			
Unit-I	**ALGORITHM FUNDAMENTALS**: Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues;Heaps, Heap sort – Sets and Disjoint Set Union – Graph;Graph representations			
sUnit-II	**DIVIDE AND CONQUER**: The General Method – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.			
Unit-III	**THE GREEDY METHOD**: The General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees; Prims,Kruskal Algorithms - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.			
Unit-IV	**DYNAMIC PROGRAMMING**: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.			
Unit-V	**BACKTRACKING:** The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem			
Reference and Textbooks: -				
Aho, Alfred V., Ullman, Jeffrey D. and Hopcroft, John E. (1996). Data structures and algorithms. Reading, Mass.: Addison-Wesley Carlos A.CoelloCoello, Gary B.Lamont, David A.Van Veldhuizen. (2007).Evolutionary Algorithms for Solving Multi-Objective Problems. Springer 2nd Edition. Langsam, Augenstien, Tenenbaum, PHI. (2012). Data Structures Using C. New Delhi: Prentice-Hall of India S.E. Goodman, ST. Hedetniem- TMH. Introduction to design and Analysis of Algorithms.				
Outcomes	➢ Ability to choose appropriate method to solve problem. ➢ Efficiency to build computational models for problem solving			

Course Code:551102	ADVANCED WEB TECHNOLOGY	Credits: 4	Hours: 4
Objectives	➢ Enrich knowledge about HTML control and web control classes ➢ Provide depth knowledge about ADO.NET		
Unit-I	**OVERVIEW OF ASP.NET -**The .NET framework – Learning the .NET languages: Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces: The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS .		
Unit-II	**DEVELOPING ASP.NET APPLICATIONS -** ASP.NET Applications: ASP.NET applications– Code behind- The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto PostBack and Web Control events- Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.		
Unit-III	**WORKING WITH DATA -** Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML		
Unit-IV	**WEB SERVICES -** Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.		
Unit-V	**ADVANCED ASP.NET -** Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability– Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.		
Reference and Textbooks: -			
Crouch Matt J. (2002). ASP.NET and VB.NET Web Programming. Addison Wesley.			
J.Liberty, D.Hurwitz. (2006). Programming ASP.NET. Third Edition. O'REILLY.			
Mathew Mac Donald. (2017). ASP.NET Complete Reference. TMH			
Outcomes	➢ Design a web page with Web form fundamentals and web control classes ➢ Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model		

Course Code:551103	ADVANCED DATABASE MANAGEMENT SYSTEMS	Credits: 4	Hours: 4
Objectives	➢ Acquire broad understanding of database concepts and database management system software and Emerging Trends in it. ➢ Learn the method of handling distributed and spatial databases.		
Unit-I	**RELATIONAL DATABASE DESIGN:**Basics, Entity Types, Relationship Types, ER Model, Relational Model and Relational Algebra – Different types of Keys -ER-to-Relational Mapping algorithm. Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF,4NF and 5NF.		
Unit-II	**DISTRIBUTED AND OBJECT BASED DATABASES:**Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.		
Unit-III	**SPATIAL DATABASE:**Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing.		
Unit-IV	**XML DATABASES:**XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, Illustrative Experiments.		
Unit-V	**TEMPORAL DATABASES:** Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints, Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.		

Reference and Textbooks: -

Abraham Silberschatz, Henry F Korth , S Sudarshan. (2015).Database System Comcepts. McGraw-Hill International Edition 6th edition.

C.J.Date, A.Kannan, S.Swamynathan. (2016). An Introduction to Database Systems.Pearson Education Reprint 8th Edition.

RamezElmasri, Shamkant B Navathe. (2016). Fundamental of Database Systems. Pearson, 7th edition.

Thomas Connolly, Carolyn Begg. (2014). Database Systems a practical approach to Design, Implementation and Management. Pearson Education.

Outcomes	➢ conceptualize data using different data models and construct database applications with back-end servers. ➢ understand Knowledge Patterns, Object Oriented and Multimedia databases.

	Elective-I		
Course Code:551551	**ADVANCED COMPUTER NETWORKS**	**Credits: 4**	**Hours: 4**
Objectives	➢ To learn security mechanism for data communication ➢ Study network fundamentals		
Unit-I	**Introduction** – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks – Network Standardization - Physical layer – Theoretical basis for data communication - guided transmission media		
Unit-II	**Wireless transmission** - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.		
Unit-III	**Elementary data link protocols**- sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Broadband Wireless – Bluetooth – RFID.		
Unit-IV	**Network layer**- design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.		
Unit-V	**Transport layer** – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP – Delay Tolerant Networksing – Network Security: Cryptography.		

Reference and Textbooks: -

D. Bertsekas and R. Gallagher. (1992).Data Networks. Prentice hall of India, New Delhi

F. Halsall. (1995).Data Communications, Computer Networks and Open Systems. Addison Wessley.

B. Forouzan. (1998).Introduction to Data Communications in Networking. Tata McGraw Hill, New Delhi.

Lamarca. ((2002)Communication Networks. Tata McGraw Hill, New Delhi.

A.S. Tanenbaum. (2011). Computer Networks. Fifth Edition, Pearson Education.

Teresa C.Piliouras. (2015). Network Design Management and Technical Perspectives. Second
   Edition Auerbach Publishers.

Outcomes	➢ To master the terminology and concepts of the OSI reference model and the TCP IP reference model. ➢ To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.

Course Code: 551552	OBJECT ORIENTED SYSTEM DEVELOPMENT	Credits: 4	Hours: 4
Objectives	□ Gain knowledge about basic concepts of UML □ Learn the basic, advanced and architectural modeling concepts		
Unit-I	**UML Introduction:** Why we model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams. Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams, Components.		
Unit-II	**Basic Behavioral Modeling:** Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Advanced Behavioral Modeling: Events and signals, State Machines, Processes and Threads, Times and space, State Chart Diagrams.		
Unit-III	**Architectural Modeling:** Artifacts, Deployment Collaborations, Patterns and Frame works, Artifact diagrams, Deployment diagrams, Systems and models.		
Unit-IV	**Unified Software Development Process:** The Unified Process,TheFour Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process.		
Unit-V	**Core Workflows:** Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.		

Reference and Textbooks: -

CraigLarman. (2005). Applying UML and Patterns: An Introduction to object-oriented
      Analysis and Design and iterative development. Third Edition, Pearson Education.
Grady Booch, James Rumbaugh, Ivor Jacbson, (2007).The Unified Modeling Language –
      User Guide, (Covering UML 2.0) 2nd Edition , Pearson Education, India.
James W- Cooper. (2000). Java Design Patterns – A Tutorial. Addison-Wesley.
Ivor Jacbson, Grady Booch, James Rumbaugh. (2008). The Unified Software
      Development Process, Pearson Education, India.
Mike O'Docherty. (2005). Object-Oriented Analysis & Design: Understanding System
      Development with UML 2.0. John Wiley & Sons.

Outcomes	□ In depth knowledge about UML and Modelling Concepts □ Systematic knowledge about Software Development Process

Course Code:551104	COMPILER DESIGN	Credits: 4	Hours: 4
Objectives	□ Compliation process, Learn context free grammars, regular expressions and finite automata □ Explore knowledge about Syntax Directed definitions and translation scheme		
Unit-I	**LEXICAL ANALYSIS:** Overview of Language Processing, The Structure of Compiler design, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata – NFA – DFA- Regular expression to automata, Transition Diagram.		
Unit-II	**SYNTAX ANALYSIS:** The role of the parser – Parse tress – Derivation - Context-free grammars(CFG) Examples - Writing a grammar - Top down Parsing; Predictive parsing - Bottom-up Parsing –Shift Reduce Parsing - LR parsers- LALR parsers - Limitations of syntax Analyzer.		
Unit-III	**SEMANTIC ANALYSIS:** Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.		
Unit-IV	**INTERMEDIATE CODE GENERATION:** Variants of Syntax trees – Three Address code – Various Code Optimizations – Basic Blocks - Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.		
Unit-V	**CODE GENERATION AND CODE OPTIMIZATION:** Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.		

Reference and Textbooks: -

A.V. Aho, RaviSethi, J.D. Ullman, Compilers. (2003).*Principles, Techniques and Tools*. Addison- Wesley.

Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman. (2011). *Compilers-Principles, Techniques and Tools*. Second Edition, Pearson Education Asia.

Allen I. Holub. (2001). C*ompiler Design in C*. Prentice Hall of India.

S.GodfreyWinster, S.Aruna Devi, R.Sujatha. (2019). *Compiler Design*. Yesdee Publishers, Third Reprint.

KennathC.Louden. (2004). *Compiler Construction Principles and Practice*. Vikas publishing House.

Outcomes	□ Knowledge of system programs. □ Skill to optimize system programs

Course Code: 551553	DOT NET PROGRAMMING	Credits: 4	Hours: 4
Objectives	➢ To explore the backbone of web page creation by developing .NET skill. ➢ To Familiar with Application, session and view state management		
Unit-I	**The NET Framework** - Learning the .NET languages - Introduction - Net revolution - .Net framework and its architecture – CLR – What is Assembly – Components of Assembly – DLL hell and Assembly Versioning- O Objects and Namespaces - Setting Up ASP.NET and IIS		
Unit-II	**Developing VB.NET Applications** - Introduction to VB.Net, The .Net Frame work and Common language runtime, Building VB. Net Application, VB IDE, forms, properties, events, VB language-console application and 46 windows application, data type, declaring variable, scope of variable, operators and statements - Windows Applicationsforms, adding controls to forms, handling events, MsgBox, Input Box, multiple forms, handling mouse and Keyboard events, object oriented programmingcreating and using classes and objects, Handling Exceptions- on Error Goto		
Unit-III	**Developing ASP.NET Applications** - ASP.NET Applications – Understanding ASP.NET Controls - Overview of ASP.NET framework, Web Form fundamentals - Web control classes – Using Visual Stdio.NET - Validation and Rich Controls -State management – Tracing, Logging, and Error Handling.		
Unit-IV	**Developing C#.NET Applications** - Introducing C# - overview of C# - Literals,Variables-Data Types, -Operators, -checked and unchecked operators – Expressions – Branching - Looping-Object Oriented Aspects Of C#: Class – Objects - Constructors and its types-inheritance, properties, indexers, index overloading – polymorphism - sealed class and methods - interface, - abstract class, operator overloading, - delegates, events, errors and exception - Threading.		
Unit-V	**ADO.NET** - Overview of ADO.NET - ADO.NET data access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data list – Data grid – Repeater – Files, Streams and Email – Using XML		
Reference and Textbooks: -			

Reference and Textbooks: -

ASP.NET. Unleashed, C# programming.Wrox publication

Christian Nagel et al. (2012). Professional C# 2012 with .NET 4.5. Wiley India.

James Holmes. (2007). Struts: The Complete Reference, 2nd Edition McGraw Hill Professional

Jesse Liberty. Programming C#. 4th Edition, O'Reilly Media

Herbert Schildt, (2012). The Complete Reference: C# 4.0. Tata McGraw Hill.

J.Liberty, D.Hurwitz. (2006). Programming ASP.NET. Third Edition, O'REILLY.

MarioSzpuszta, Matthew MacDonald. Pro ASP.NET 4 in C# 2010: Includes Silverlight 2. Apress, Third Edition

Mathew Mac Donald. (2005). ASP.NET Complete Reference. TMH

Tim Anderson. Visual Basic. Net programming in easy steps.Dreamtech Press

Steven Holzner. Visual Basic. NET Black Book.

Outcomes	➢ Learn major programming paradigms and techniques involved in design and implementation of modern programming languages. ➢ Students can develop, implement and creating applications with C#. VB.NET and ASP.NET

Course Code: 551554	OPTIMIZATION TECHNIQUES	Credits: 4	Hours: 4
Objectives	➢ Understand the concept of optimization Techniques ➢ Develop mathematical models to solve real life problems		
Unit-I	**Linear Programming Problem** (LPP): Formulations of LPP - Graphical Solution of LPP problems (2 variables) - Canonical and Standard Forms of Linear Programming Problem - Simplex Method- Artificial Variable Method - Two Phase Simplex Method		
Unit-II	**Duality in LPP** - Dual Problem to Primal – Primal Problem to Dual Problem - Dual Simplex Method - Revised Simplex Method - Revised Simplex Algorithm - Revised Simplex versus Simplex Method		
Unit-III	**Transportation Model**: North West Corner Method - Least Cost Method - Vogel's Approximation Method – Finding Optimum Solution - Determining Net evaluation-Degeneracy in TP- Assignment Model : Hungarian assignment model – Travelling Salesman Problem		
Unit-IV	**Replacement Problem**: Replacement Policy for equipment that deteriorate gradually - Replacement of Item that fail suddenly - Individual and Group Replacement- Problems in mortality and staffing.		
Unit-V	**Project Scheduling**: PERT/CPM Network Diagram for Projects – Fulkerson's Rule – Measure of Activity – PERT Computation; Example – CPM Network with Example – Resource Scheduling.		
Reference and Textbooks: - S.GodfreyWinster, S. Aruna Devi, R.Sujatha. Compiler Design. Yesdee Publishing. John W.Chinneck. (2015). Feasibility and Infeasibility in Optimization-Algorithms and Computational Method. Springer. S.Kalavathy: Operations Research. Second Edition. Vikas Publishing House Pvt.Ltd., KantiSwarup, P.K. Gupta &Manmohan. (1996). Operation Research. D.Shanthi, N.UmaMaheswari, S.Jeyanthi. Theory of Computation. Yesdee Publish			
Outcomes	➢ Finding feasibility for solving an optimization problem ➢ Knowledge of Optimization Techniques to solve Industrial problems.		

Semester – II			
Course Code: 551201	**DISTRIBUTED OPERATING SYSTEM**	**Credits: 4**	**Hours: 4**
Objectives	➢ To learn the distributed resource management components. ➢ To understand hardware, software and communication in distributed OS		
Unit-I	**INTRODUCTION**: Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources, Reusable Resources.		
Unit-II	**DISTRIBUTED OPERATING SYSTEMS:** Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport's Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols		
Unit-III	**DISTRIBUTED RESOURCE MANAGEMENT**: Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.		
Unit-IV	**FAILURE RECOVERY AND FAULT TOLERANCE**: Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.		
Unit-V	**MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS**: Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.		
Reference and Textbooks: - Abraham Silberschatz, Peter B.Galvin, G.Gagne. (2003). Operating Concepts. 6th Edition Addison Wesley publications Andrew S. Tanenbaum, PHI. Distributed Operating System. Andrew S.Tanenbaum. (2001). Modern Operating Systems. 2nd Edition Addison Wesley. MukeshSinghalN.G. Shivaratri. (2011). Advanced Concepts in Operating Systems. McGraw Hill.			
Outcomes	➢ Knowledge on resource management by mutual exclusion and Deadlock detection of Distributed operating system. ➢ Ability to design and implement algorithms of distributed shared memory and commit protocols		

Course Code: 551202	ADVANCED JAVA PROGRAMMING	Credits: 4	Hours: 4
Objectives	➢ To deepen student's programming skills by analyzing the real world problem in a programmer's point of view and implement the concepts in real time projects ➢ To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming		
Unit-I	**DESIGN PATTERNS:** Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator		
Unit-II	**APPLET FUNDAMENTALS**: Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application **-** Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table –Tabbed panels–Progressive bar - Sliders		
Unit-III	**JDBC -INTRODUCTION** - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.		
Unit-IV	**SERVLET:** Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.		
Unit-V	**LAMBDA EXPRESSIONS**: Method Reference- Functional Interface- Streams API, Filters- Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)- Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator- Multiresolution Image API		

Reference and Textbooks: -

Bert Bates, Karthy Sierra , Eric Freeman, Elisabeth Robson. (2009). Head First
        Design Patterns. O'REILLY Media Publishers.(1st-Unit).

Herbert Schildt. (2017). Java: A Beginner Guide. Oracle Pres-Seventh Edition. (2nd and 3rd
        Unit).

Jan Graba. An Introduction to Network Programming with Java-Java 7 Compatible. 3rd
        Edition, Springer.

Murach's. (2014). Java Servlets and JSP, 3ndEdition, MikeMurach& Associates Publishers; 3rd
        Edition. (4th Unit).

Paul Deitel and Harvey Deitel. Java: How to Program. Prentice Hall Publishers; 9th Edition. Warburton Richard. (2014). Java 8 Lambdas. Shroff Publishers & Distributors Pvt Ltd. (5th Unit).	
Outcomes	➢ Able to develop a Graphical User Interface (GUI) with Applet and Swing. ➢ Develop a Client-Server Application with Database Maintenance.

Course Code: 551203	CRYPTOGRAPHY AND NETWORK SECURITY		Credits: 4	Hours: 4
Objectives	➢ To understand Cryptography Theories, Algorithms and Systems. ➢ To understand necessary Approaches and Techniques to build protection			
Unit-I	**INTRODUCTION -** Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.			
Unit-II	**SYMMETRIC ENCRYPTION AND MESSAGE CONFIDENTIALITY -** Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4, Chipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. **Public-key CRYPTOGRAPHY AND MESSAGE AUTHENTICATION:** Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, RSA algorithm – Rabin – Elgamal – Elliptic Curve Cryptography,Digital Signatures, Key Management.			
Unit-III	**AUTHENTICATION APPLICATIONS -** Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.			
Unit-IV	**IP SECURITY -** IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Web Security: Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer Security(TLS), HTTPS. Secure Electronic Transaction(SET).Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.			
Unit-V	**INTRUDERS -** Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **FIREWALLS:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.			

Reference and Textbooks: -

Behrouz A. Ferouzan. (2015). Cryptography & Network Security. Tata Mc Graw Hill, Reprint.

Bruce Schneier And Neils Ferguson. (2003). Practical Cryptography. First Edition, Wiley
        Dreamtech India Pvt Ltd.

Charlie Kaufman AndRadia Perlman, Mike Speciner. (2002). Network Security. Second
        Edition, Private Communication In Public World PHI.

Charles Pfleeger.(2006). Security In Computing. 4th Edition, Prentice Hall Of India.

Douglas R Simson. (1995). Cryptography – Theory And Practice. First Edition, CRC Press.

Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms And Protocols",
        Wiley Publications, 2003.

Stallings William. (2017). Cryptography and Network SecurityPrinciples and Practice.

Ulysess Black. (2000). Internet Security Protocols. Pearson Education Asia.

William Stallings. (2013). Network Security Essentials Applications and Standards. 5[th]Edition,
        Pearson Education

Outcomes	➢ Apply the different cryptographic operations of symmetric and asymmetric cryptographic algorithms ➢ Apply the various Authentication schemes to simulate different applications.

	Elective - II		
Course Code:551555	**WIRELESS NETWORKS**	**Credits: 4**	**Hours: 4**
Objectives	➢ Learn Wireless network technologies, protocols and standards. ➢ Study fundamentals of 3G Services, its protocols and applications.		
Unit-I	**WIRELESS LAN:** Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum - IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security – IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX		
Unit-II	**MOBILE NETWORK LAYER:** Introduction – Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet-Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing		
Unit-III	**MOBILE TRANSPORT LAYER**: TCP enhancements for wireless protocols – Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility – Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP – TCP over 3G wireless networks.		
Unit-IV	**WIRELESS WIDE AREA NETWORK:** Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.		
Unit-V	**4G NETWORKS:** Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.		

Reference and Textbooks: -
 Anurag Kumar, D.Manjunath, Joy kuri. (2011). Wireless Networking. First Edition, Elsevier.
 Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming. (2008). 3G Evolution HSPA and
         LTE for Mobile Broadband. Second Edition, Academic Press.
 Jochen Schiller. (2012). Mobile Communications. Second Edition, Pearson Education. (Unit
         I,II,III)
 Simon Haykin , Michael Moher, David Koilpillai. Modern Wireless Communications.
 Vijay Garg. (2007). Wireless Communications and networking. First Edition, Elsevier. (Unit
         IV,V)			

Outcomes	➢ Good Knowledge in 3G/4G and WiMAX networks and its architecture. ➢ Design and implement wireless network for any application		

Course Code:551556	SOFTWARE ARCHITECTURE	Credits: 4	Hours: 4
Objectives	➢ Understand architectural requirements ➢ Identify architectural structures		
Unit-I	**ARCHITECTURAL DRIVERS** Introduction – Standard Definitions of Software Architecture– Architectural structures – Influence of software architecture on organization – Architecture Business Cycle – Functional requirements – Technical constraints – Quality Attributes – Quality Attribute Workshop (QAW) – Documenting Quality Attributes – Six part scenarios		
Unit-II	**ARCHITECTURAL VIEWS AND DOCUMENTATION** Standard Definitions for views – Structures and views- Perspectives: Static, dynamic and physical and the accompanying views – Representing views-available notations – Good practices in documentation– Documenting the Views using UML – Merits and Demerits of using visual languages – Need for formal languages - Architectural Description Languages – ACME		
Unit-III	**ARCHITECTURAL STYLES** Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style		
Unit-IV	**ARCHITECTURAL DESIGN** Approaches for architectural design – System decomposition – Attributes driven design – Architecting for specific quality attributes – Performance, Availability – Security – Architectural conformance		
Unit-V	**ARCHITECTURE EVALUATION AND SOME SPECIAL TOPICS** Need for evaluation – Scenario based evaluation against the drivers – ATAM and its variations – Case studies in architectural evaluations – SOA and Web services – Cloud Computing – Adaptive structures		

Reference and Textbooks: -

Anthony J Lattanze. (2010). Architecting Software Intensive System. A Practitioner's Guide. Auerbach Publications.

David Garlan and Mary Shaw. (1996). Software architecture: Perspectives on an emerging discipline. Prentice Hall.

Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford. (2010). Documenting Software Architectures. Views and Beyond. 2nd Edition, Addison-Wesley.

Paul Clements, Rick Kazman, and Mark Klein. (2001). Evaluating software architectures: Methods and case studies. Addison-Wesley.

Len Bass, Paul Clements, and Rick Kazman. (2003). Software Architectures Principles and Practices. 2n Edition, Addison-Wesley.

Outcomes	➢ Explain key architectural drivers ➢ Explain the influence of architecture on business and technical activities

Course Code:551557	EMBEDDED SYSTEMS	Credits: 4	Hours: 4
Objectives	➢ Understand the basic structure and concepts of an an embedded system. ➢ Describe the hardware software, co-design and firmware design approaches		
Unit-I	**Introduction to Embedded system** - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems		
Unit-II	**Elements of an Embedded system** - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components		
Unit-III	**Embedded Systems - Washing machine:** Application-specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware.		
Unit-IV	**RTOS based Embedded System Design:** Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - choosing an RTOS.		
Unit-V	**Components in embedded system development environment -** Files generated during compilation, simulators, emulators and debugging - Objectives of Embedded product Development Life Cycle - Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.		

Reference and Textbooks: -

Cliff Young, Faraboschi Paolo, and Joseph A. Fisher. (2005). Embedded Computing: A
       VLIW Approach to Architecture, Compilers and Tools. Morgan Kaufmann
       Publishers, An imprint of Elsevier.

David E. Simon. (1999). An Embedded Software Primer Pearson Education.

Frank Vahid, Tony Givargis. (2006). Embedded System Design. John Wiley. Third
       Edition.

Raj Kamal. (2009). Embedded Systems: Architecture, Programming and Design.
       TMH. Second Edition.

K. V. Shibu. (2009). Introduction to embedded systems. TMH education Pvt. Ltd.

Outcomes	➢ Do software optimizastion and aware of interrupts and hyper threading. ➢ Design real time embedded systems within realistic constraints using the concepts of RTOS.

Course Code: 551558	STATISTICAL COMPUTING	Credits: 4	Hours: 4
Objectives	➢ Learn various Correlation and Regression methods ➢ Knowledge sampling concepts		
Unit-I	**Correlation -** Definition - Scatter Diagram- Kari Pearson's Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r- Coefficient of Determination **-** Merits and Limitations of Coefficient of Correlation- Spearman's Rank Correlation(7.1-7.9.4).		
Unit-II	**Regression Analysis -** Regression and Correlation (Basic Differences) - Difference between Correlation and Regression Analysis- Linear Regression Equations - Least Square Method- Regression Lines - Properties of Regression Coefficients-Standard Error of Estimate.(8.1-8.8)		
Unit-III	**Probability Distribution and Mathematical Expectation-** Random Variable- Defined - Probability Distribution a Random Variable- Expectation of Random Variable- Properties of Expected Value and Variance(12.2-12.4).		
Unit-IV	**Sampling Distributions -** Data Collection- Sampling and Non-Sampling Errors – Principles of Sampling-- Merits and Limitations of Sampling- Methods of Sampling- Parameter and Statistic- Sampling Distribution of a Statistic- Examples of Sampling Distributions- Standard Normal, Student's t, Chi-Square (x^2) and Snedecor's F- Distributions(14.1-14.16).		
Unit-V	**Statistical Inference-Estimation and Testing of Hypothesis -** Statistical Inference- Estimation- Point and interval- Confidence interval using normal, t and x^2 Distributions- Testing of Hypothesis- Significance of a mean - Using t Distribution(15.1-15.10.2).		

Reference and Textbooks: -

N. P. Bali, P. N. Gupta, C. P. Gandhi. (2008). A Textbook of Quantitative Techniques. First Edition, Laxmi Publications.

Christopher Chatfield. (2015). Statistics for Technology- A Course in Applied Statistics. Third Edition CRC Press.

David Makinson. (2011). Sets, Logic and Maths for Computing. Springer.

K.L. Sehgal. (2011). Quantitative Techniques and Statistics. First Edition, Himalaya Publishing House.

U. K. Srivastava, G. V. Shenoy, S. C. Sharma. (2005). Quantitative Techniques for Managerial Decisions. Second Edition, New Age International Publishers.

Outcomes	➢ Data analytics from a database formed from the real world problem ➢ Predict the exact reason for the real time issues

Elective - III			
Course Code:551559	**ADVANCED DATA MINING TECHNIQUES**	**Credits: 4**	**Hours: 4**
Objectives	➢ Examine the types of the data to be mined ➢ Explore and understand data mining algorithms		
Unit-I	Data Mining, Data Mining task primitives, Integration of Data Mining system with the database, Major issues in Data Mining, Data Preprocessing, Descriptive data summarization, Data cleaning, Data integration and transformation.		
Unit-II	Frequent patterns, Market basket analysis, Association Rule, Support and Confidence, overview of multilevel association rule, multidimensional association rule, closed itemset, maximal item set, Apriori algorithm, Generating association rule from frequent itemset, Mining frequent item sets without candidate generation (FP- growth), Mining multilevel association rules, Mining multidimensional association rules, Mining quantitative association rules, Association analysis to correlation analysis		
Unit-III	Classification and Prediction, Classification by Decision Tree Induction, Attribute selection measures, Bayes Theorem, Predicting a class label using Bayesian classification, Classification by Back propagation, A multilayer feed forward neural network, Prediction: Linear Regression, Nonlinear Regression.		
Unit-IV	Hierarchical Algorithms: Agglomerative Algorithm, Divisive Clustering, Partitional Algorithm: Squared Error Clustering Algorithim, k-means clustering, Nearest neighbor algorithm, Clustering with Neural networks: Hebbian Learning, Self Organizing Map, Clustering large database: DBSCAN.		
Unit-V	Web Content Mining: Crawlers, Harvest System, Virtual Web View, Personalization, Web Structure Mining: Page Rank, Clever, Web Usage Mining: Preprocessing, Pattern Discovery, Pattern Analysis.		

Reference and Textbooks: -

M. H.Dunham. (2003).Data Mining : Introductory and Advanced Topics. Pearson Education,
       Delhi.

Jiawei Han, MichelineKamber. Data Mining Concepts andTechniques. Elsevier.

       Margaret H. Dunham, Pearson. Data Mining-Advanced Topics

PaulrajPonnaiah. (2001).Data Warehousing Fundamentals. Wiley Publishers.

Roiger, Michael W. Geatz and Pearson Education. Data Mining.

S.N. Sivananda and S. Sumathi. (2006).Data Mining. Thomsan Learning, Chennai.

Outcomes	➢ Familiar with data mining concepts for solving real world problems ➢ Discover and measure interesting patterns from different kinds of database

Course Code: 551560	SOFTWARE PROJECT MANAGEMENT	Credits: 4	Hours: 4
Objectives	➢ Understand the framework of project management. ➢ Learn requisites of SPM		
Unit-I	**Project Management Framework:** Introduction: Definition of Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. **The Standard for Project Management of a Project**: Project management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.		
Unit-II	**Methodologies and Technologies** – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype - **Agile Methods** – Extreme Programming - Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban methods-uncertainty, Risk, and lifecycle selection-Scrum Elements overview-5 levels of planning-Scrum Process overview-Agile Team-roles and responsibilities- Epic-feature-User Stories-PBI-The Sprint.		
Unit-III	**The Project Management Knowledge Areas:** Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.		
Unit-IV	**Project Cost Management**: Estimate costs - Determine budget - Control costs. Project Quality Management: Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management: Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.		
Unit-V	**Project Risk Management**: Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.		

Reference and Textbooks: -

A guide to the Project management Body of Knowledge (PMBOK Guide). Fouth

      Edition, Project Management Institute, Pennsylvania.

Benjamin A. Lieberman. (2010). The Art of Software Modeling. Auerbach

      Publications.

BOB Huges, Mike Cotterell, Rajib Mall. (2011). Software Project Management. McGraw Hill, Fifth

      Edition.Emerson. Agile Handbook. Philosophie Futrell. Quality Software Project

      Management. Pearson Education India.

C.Ravindranath Pandian. (2015). Applied Software Risk Management-A Guide for Software Project ManagersAuerbach Publications. Royce. Software Project Management. Pearson Education India.	
Outcomes	➢ Analyze the scope, quality of the project, cost, timing for success of project. ➢ Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

Course Code:551561	WEB SERVICES	Credits: 4	Hours: 4
Objectives	➢ To Understand Web Services and implementation model for SOA ➢ To Understand the SOA, its Principles and Benefits		
Unit-I	Evolution and Emergence of Web Services **-** Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.		
Unit-II	Web Service Architecture - Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.		
Unit-III	Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.		
Unit-IV	Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.		
Unit-V	SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.		
Reference and Textbooks: -			
S. Chatterjee, J. Webber. Developing Enterprise Web Services. Pearson Education.			
James Snell, Doug Tidwell, Pavel Kulchenk. Programming Web Services with SOAP: Building Distributed Applications.			
Martin Kalin. Java Web Services: Up and Running. Oreiley Media			
Michael P. Papazoglou.JWeb Services & SOA Principles and Technology, Second Edition			
R. Nagappan, R. Skoczylas, R.P. Sriganesh. Developing Java Web Services. Wiley India.			
Outcomes	➢ Developing web services ➢ Managing Enterprise framework with SOA		

Course Code: 551562	WAP AND XML	Credits: 4	Hours: 4
Objectives	➢ The purpose of the course is to impart knowledge on eXtensibleMarkup Language ➢ To achieve secured, messaging through web services		
Unit-I	**Overview of WAP :** WAP and the wireless world – WAP application architecture – WAP internal structure – WAP versus the Web – WAP 1.2 – WTA and push features. Setting up WAP: Available software products – WAP resources – The Development Toolkits.		
Unit-II	**WAP gateways :** Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway Basic WML: Extensible markup language – WML structure – A basic WML card – Text formatting – navigation – Advanced display features.		
Unit-III	**Interacting with the user :** Making a selection – Events – Variables – Input and parameter passing. WML Script: Need for WML script – Lexical Structure – Variables and literals – Operators – Automatic data type conversion – Control Constructs Functions – Using the standard libraries – programs – Dealing with Errors.		
Unit-IV	**XML :** Introduction XML: An Eagle's Eye view of XML – XML Definition – List of an XML Document – Related Technologies – An introduction to XML Applications – XML Applications – XML for XML – First XML Documents Structuring Data: Examining the Data XMLizing the data – The advantages of the XML format – Preparing a style sheet for Document Display.		
Unit-V	**Attributes, Empty Tags and XSL :** Attributes – Attributes Versus Elements – Empty Tags – XSL – Well formed XML documents – Foreign Languages and Non Roman Text – Non Roman Scripts on the Web Scripts, Character sets, Fonts and Glyphs – Legacy character sets– The Unicode Character set – Procedure to Write XML Unicode.		

Reference and Textbooks: -

Eliotte Rusty Harlod. (2000). XML TM Bible. Books India (P) Ltd. (For Unit IV & V)

Heather Williamson. XML: The Complete Reference. Tata McGraw-Hill Education India.

State Integrated Board of Studies – Computer Science PG 54 Charles Arehart and Others. (2000).

Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML.

    Shroff Publishers and Distributers Pvt.   (For Unit I, II, III)

Outcomes	➢ Apply XML concepts to develop Web application ➢ Develop SOA application using XML and Web Services.

Semester-III			
Course Code: 551301	**Digital Image Processing**	**Credits:4**	**Hours:4**
Objectives	- To learn variousimage Transforms, Image Enhancement Techniques, Image restoration Techniques andmethods in different domains - To learn image compression and Segmentation techniques used in digital image processing. - Learn image compression Techniques.		
Unit-I	**FUNDAMENTALS:** Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models. **COLOR MODELS:** Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.		
Unit-II	**SPATIAL DOMAIN:** Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods. **FREQUENCY DOMAIN:** Image transforms: FFT, DCT, Karhunen-Loevetransform,Hotlling's T^2 transform, Wavelet transforms and their properties. Image filtering in frequency domain.		
Unit-III	**EDGE DETECTION:** Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.		
Unit-IV	**IMAGE COMPRESSION:** Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform basedcoding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.		
Unit-V	**IMAGE SEGMENTATION:** Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds. The use of motion in segmentation, Image Segmentation based on Color. **Morphological Image Processing:** Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology		

Reference and Textbooks: -

B. Chan la, D. Dutta Majumder.(2003).Digital Image Processing and Analysis, PHI.

K. Jain.(2015).Fundamentals of Image Processing, Second Ed., PHI, New Delhi.

Nick Elford(2004) .Digital Image Processing a practical introducing using Java. Pearson
  Education.

L.Prasad, S.S.Iyengar.(2015).Wavelet Analysis with Applications to Image Processing. CRC
  Press.

Rafael Gonzalez, Richard E. Woods.(2017). Digital Image Processing. Fourth Edition,
  PHI/Pearson Education

Todd R.Reed.(2015).Digital Image Sequence Processing, Compression, and Analysis. CRC
  Press.

Outcomes	➤ Capacity to work with image transformation, Image enhancement techniques
	➤ Well versed in Image restoration techniques and methods
	➤ Potential to image compression and segmentation principles

Course Code: 551302	INTERNET OF THINGS	Credits:4	Hours:4
Objectives	➢ Gain knowledge on bases of Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT. ➢ Understand the concept of the Web of Things and relationship between the IoT and WoT. ➢ Study application area of IoT		
Unit-I	**INTRODUCTION To IoT**: Internet of Things - Physical Design- Logical Design-IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG-IoT Platforms Design Methodology.		
Unit-II	**IoT ARCHITECTURE**: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture		
Unit-III	**IoT PROTOCOLS:** Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security		
Unit-IV	**WEB OF THINGS:** Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.		
Unit-V	**APPLICATIONS:** The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.		

Reference and Textbooks: -

ArshdeepBahga, Vijay Madisetti, (2015).Internet of Things – A hands-on approach.
        Universities Press.

Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds).(2011).Architecting the Internet
        of Things. Springer.

David Easley and Jon Kleinberg, (2010).Networks, Crowds, and Markets: Reasoning About a
        Highly Connected World - Cambridge University Press.

Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand.

David Boyle.(2014).From Machine to-Machine to the Internet of Things - Introduction to a New Age of
Intelligence. Elsevier.

Olivier Hersent, David Boswarthick, Omar Elloumi.(2012).The Internet of Things – Key
        applications and Protocols.Wiley.

Outcomes	➢ Gain good knowledge of IoT and Web of Things to program IoT related products in real life. ➢ Knowledge of IoT protocols ➢ It helps to rely less on physical resources and started to do their work smarter.

Course Code: 551303	MACHINE LEARNING	Credits:4	Hours:4
Objectives	➢ To provide the student a comprehensive introduction to various topics in machine learning. ➢ To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems. ➢ Study Instant and Advanced Learning		
Unit-I	**INTRODUCTION:** Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.		
Unit-II	**NEURAL NETWORKS AND GENETIC ALGORITHMS** :Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.		
Unit-III	**BAYESIAN AND COMPUTATIONAL LEARNING** : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.		
Unit-IV	**INSTANT BASED LEARNING**: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Instant Based Learning:Instant Space- Lazy Learning- MotorSkills,- Instant learning Algorithms - Case Based Learning.		
Unit-V	**ADVANCED LEARNING** : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning		
Reference and Textbooks: -			
EthemAlpaydin.(2004).Introduction to Machine Learning (Adaptive Computation and Machine Learning).The MIT Press. Stephen Marsland.(2009).Machine Learning: An Algorithmic Perspective.CRC Press. Tom M. Mitchell.(2017).Machine Learning. McGraw-Hill Education (India) Private Limited. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham. Genetic Algorithms and Genetic Programming. CRC Press Taylor and Francis Group.			
Outcomes	➢ Design machine learning solutions to real-world problems ➢ Implement machine learning solutions to classification, regression, and clustering problems; ➢ Algorithm development skill for Instant learning		

Elective-IV			
Course Code: 551563	**CLOUD COMPUTING**	**Credits:4**	**Hours:4**
Objectives	➢ In-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing ➢ Learn fundamental issues, technologies, applications and implementations.		
Unit-I	**Cloud computing basics:** Cloud computing definition - Characteristics - Benefit-Challenges - Distributed Systems- Virtualization-Service-oriented computing-Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.		
Unit-II	**Cloud services:**IaaS- Amazon Web Servicws, VMWare vCloud, PaaS – Google App Engine, Windows Azure Platform, SaaS - Salesforce.com, Google Apps. Other services - Compute Service - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services		
Unit-III	**Virtualization:** Virtualization- Characteristics- Taxonomy – Types - Pros and Cons - Examples Architecture: Reference model- types of clouds - Hypervisor Management Software-Logical Partitioning (LPAR) - VIO Server-Virtual Infrastructure Requirements-Cloud Virtualization: Introduction-Storage Virtualization-Storage Area Network-Cloud Server Virtualization-Virtualized Data Centre.		
Unit-IV	**Cloud application design and development:** Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.		
Unit-V	**Multimedia Cloud And Cloud Security:** Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing-Cloud for Industry, Healthcare & Education.		

Reference and Textbooks: -

ArshdeepBahga, Vijay Madisetti.(2016).Cloud Computing: A Hands – On Approach.

       Universities press (India) Pvt. Limited.

Buyya, Vecciola and Selvi.(2013).Mastering Cloud Computing: Foundations and Applications

       Programming, Tata McGraw Hill.

Kris Jamsa.(2012).Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models,

       Mobile,Security and More, Jones & Bartlett Learning.

Dr. Kumar Saurabh.Cloud Computing – Insight into New-Era Infrastructure.First Edition 2011,

       ISBN: 978-81-265-2883-7, WISELY India Pvt. Ltd, New Delhi.

Rittinghouse and Ransome.(2016).Cloud Computing: Implementation, Management, and

       Security, CRC Press.

Michael Miller. (2008).Cloud Computing Web based application that change the way you work

       and collaborate online. Pearson edition.

Outcomes	➢ Systematic knowledge of the cloud technologies, architecture, virtual server usage and virtual server managemettechiques. ➢ Learn to use cloud services and secured the cloud data

Course Code:551564	PRINCIPLES OF SOFT COMPUTING	Credits:4	Hours:4
Objectives	➢ Studying Fundamentals of Soft Computing ➢ Get idea of Fuzzy and GA to apply in Soft Computing ➢ Practice of Soft Computing in TSP, Fuzzy Sets, Internet Search		
Unit-I	**Introduction –** Neural Networks – Scope of Neural Networks – Fuzzy Logic - Genetic Algorithm – Hybrid Systems – Soft Computing;- Artificial Neural Network: Fundamental Concept – Evolution of Neural Networks – Models of Artificial Neural Network(ANN) – Technologies of ANNs – McCulloch-Pitts Neuron – Linear Seperability – Hebb Network.		
Unit-II	**Supervised Learning Neural Network –** Introduction – Perception Networks – Adaptive Linear Neuron – Multiple Adoptive Linear Neurons – Adaptive Networks – Back-Propagation Network – Hopfield Network – Tree Neural Networks – **Unsupervised Learning Networks:** Introduction – Kohonen Self- Organizing Feature Maps – Learning Vector Quantization – Counterpropagation Networks.		
Unit-III	**Fuzzy Logic:** Classical Sets – Fuzzy Sets – Classical Relation – Fuzzy Relation – Membership Functions – Defuzzification - Fuzzy Arithmetic – Fuzzy Measures – Fuzzy Integrals – Fuzzy Rule Base Reasoning:Fuzzy Proposition –Decomposition of Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert System – Fuzzy Decision making – Fuzzy Control Systems- Control System Design – FLC System Model.		
Unit-IV	**Genetic Algorithm :** Introduction – Biological Background –Basic operators and Terminologies in GAs – Genetic VS Traditional Algorithms – Creation of offsprings – Working Principle – Encoding – Fitness Function- Simple GA – General Genetic Algorithm – GA Operators: Reproduction – Cross Over - Mutation – Classification of GA – Working of Genetic Programming – Characteristics of Genetic Programming - Applications of GA.		
Unit-V	**Applications of Soft Computing :** Image Fusion – Neural Network Classification – Travelling Salesperson Problem using GA – GA based Internet Search Techniques – Representation of Genomes – GA to maximize $F(x1,x2) = 4x1 + 3x2$ – Minimize $F(x) = x*x$ – Primitive operations on Fuzzy Sets.		
Reference and Textbooks: - Neuro-Fuzzy and Soft Computing, A Computational Approach to Learning and Machine Inteeligence, (2012)PHI Learning Pvt. Ltd., New Delhi. S.Rajasekaran, GA.VijayalakshmiPai.(2011)Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications, PHI Learning Pvt. Ltd., New Delhi. Simon Haykin.(2013).Neural Networks and Learning Machines, PHI Learning Pvt. Ltd., New Delhi. (Eastern Economy Third Edition) S.N.Sivanandam, S.N.Deepa .(2014). Principles of Soft Computing.Wiley India Private Ltd. New Delhi.			
Outcomes	➢ Students have good knowledge of working with Soft Computing ➢ Invoking Fuzzy principles and Genetic Algorithms in Problem Solving ➢ Ability to solve any soft Computing Problem		

Course Code:551565	DATA SCIENCE AND BIG DATA ANALYTICS	Credits:4	Hours:4
Objectives	- Learning basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem. - Study tools including MapReduce, Hadoop and its ecosystem - Study classification principles for Analytics		
Unit-I	**Introduction to Big Data Analytics :** Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Analytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.		
Unit-II	**Basic Data Analytic Methods Using R :** Introduction to R programming – R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis : Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation -– Statistical Methods of Evaluation : Hypothesis Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA..		
Unit-III	**Advanced Analytical Theory and Methods:** Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics – Reasons to choose and cautions – Additional Algorithms - Association Rules : A Priori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing – Diagnostics. Regression : Linear Regression and Logistic Regression :– Use cases – Model Description – Diagnostics - Additional Regression Models.		
Unit-IV	**Classification :** Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na'ive Bayes – Bayes Theorem – Naïve Bayes Clasifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis : Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.		
Unit-V	**Advanced Analytics-Technology and Tools:**MapReduce and Hadoop : Analytics for Unstructured Data .- *UseCases* - *MapReduce* - Apache Hadoop – The Hadoop Ecosystem – pig – Hive – Hbase – Manout – NoSQL - Tools in Database Analytics : SQL Essentials - In Database Text Analysis - Advanced SQL - Analytics Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization		

Reference and Textbooks: -

Anil Maheshwari.(2017).Data Analytics. McGraw Hill Education.

John Wiley & Sons.(2015)Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", EMC Education Services Published by John Wiley & Sons , Inc

Noreen Burlingame.(2012).The little book on Big Data. New Street publishers.

Norman Matloff.(2011).The Art of R Programming: A Tour of Statistical Software Design. No Starch Press; 1 edition.

SandipRakshit.(2011).R for Beginners. McGraw Hill Education, 2011 http://www.johndcook.com/R_language_for_programmers.html. http://bigdatauniversity.com/.	
Outcomes	➢ Able to understand the key concepts of Data Science and Data Analytics ➢ Able to apply Hadoop ecosystem components. ➢ Able to participate data science and big data analytics projects

Course Code: 551566	WEB MINING	Credits:4	Hours:4
Objectives	- To understand data mining process and techniques, specifically those that are relevant to Web mining - To Understand the basics of Information retrieval and Web search with special emphasis on web Crawling - To understand the role of hyper links in web structure mining		
Unit-I	**Introduction** – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval Models-Relevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming		
Unit-II	**Web Content Mining** – Supervised Learning – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers. Unsupervised Learning - K-means Clustering - Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-Based Clustering - Evaluating Classification and Clustering – Vector Space Model – Latent semantic Indexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification		
Unit-III	**Web Link Mining** – Hyperlink based Ranking – Introduction -Social Networks Analysis- Co-Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search - Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A Basic Crawler Algorithm- Implementation Issues- Universal Crawlers- Focused Crawlers- Topical Crawlers- Evaluation - Crawler Ethics and Conflicts - New Developments		
Unit-IV	**Structured Data Extraction:** Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning •- Automatic Wrapper Generation: Problems - String Matching and Tree Matching -.Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages-Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analyzing Web Social Networks.		
Unit-V	**Web Usage Mining** - Click stream Analysis -Web Server Log Files - Data Collection and Pre-Processing - Cleaning and Filtering- Data Modeling for Web Usage Mining - The BIRCH Clustering Algorithm -Affinity Analysis and the A Priori Algorithm – Binning. Discovery and Analysis of Web Usage Patterns – Modeling user interests –Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering- Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models		
Reference and Textbooks: -			

Bing Liu.(2009).Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-
        Centric Systems and Applications).Springer; 2nd Edition.
Guandong Xu ,Yanchun Zhang, Lin Li,(2010).Web Mining and Social Networking:
        Techniques and Applications. Springer; 1st Edition.
SoumenChakrabarti.(2002). Mining the Web: Discovering Knowledge from Hypertext Data.
        Morgan Kaufmann; edition.
Zdravko Markov, Daniel T. Larose,(2007).Data Mining the Web: Uncovering Patterns in
        Web Content, Structure, and Usage. John Wiley & Sons, Inc.

Outcomes	- Build a sample search engine using available open source tools - Identify the different components of a web page that can be used for mining - Apply machine learning concepts to web content mining

Course Code:551567	MOBILE COMPUTING AND GREEN IT	Credits:3	Hours:6
Objectives	➢ Gain knowledge about basic concepts and principles in mobile computing ➢ Learn about the mobile architectures and emerging trends ➢ Understand the importance of Green IT as well as Virtualization concept		
Unit-I	**Introduction** – Mobile Computing Architecture – Three-tier Architecture – Design Considerations – Mobile Computing through Internet – Making existing systems mobile enabled – Mobile computing through Telephony – Emerging Technologies		
Unit-II	**GSM** - Architecture – Routing – Network aspect – Mobility – SMS – GPRS – Network Architecture –Applications – Limitations – WAP – CDMA vs GSM – 3G Networks		
Unit-III	**Wireless LAN** Architecture – Intelligent Networks and Interworking – Security issues in Mobile computing – Techniques and Algorithms – Protocols – Security models – Frameworks – Next generation Networks		
Unit-IV	**Importance of Green IT** – Significance of Green IT and Green Data centres - Steps towards Green IT – Basics of Green IT – Data centre design and build business – Collaboration of Building energy management and IT energy management – Energy utilities – Government – Universities – Green grid collaboration agreements – collaboration and carbon trading – IT vendors and collaboration.		
Unit-V	**Regulation and EPA Activity** – Regulating greenhouse gases – Role of EPA – IT companies support – Educational institutions – Energy ratings in Green IT – energy efficient rating for IT – IT vendors help. Consolidation and Virtualization – Server Virtualization – Storage Virtualization – Client Virtualization –Virtual Servers – Blade Servers – Impact of Server virtualization		

Reference and Textbooks: -

Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal.(2010).Mobile Computing –
Technology, Applications and ServiceCreation. 2nd Edition", Tata McGraw Hill.

FeiHu ,Xiaojun Cao.(2010).Wireless Sensor Networks Principles and Practice. CRC Press.

Jochen Schiller.(2012).Mobile Communications.Second Edition.

John Lamb.(2009).The Greening of IT: How Companies Can Make a Difference for the
Environment.IBM Press.

Marty Poniatowski.(2009).Foundation of Green IT, Prentice Hall.

Toby J. Velete, Anthony T. Velete, Robert Elsenpeter.(2008).Green IT – Reduce Your Information
System's Environmental Impact While Adding to the Bottom Line – 5th Edition,
McGraw-Hill

William Stallings.(2009).Wireless Communications & Networks. Pearson Education.

Outcomes	➢ Describe the basic concepts and principles in mobile computing ➢ In depth knowledge about the mobile architectures and emerging trends ➢ Understand the need for Green IT and explore the necessity of virtualization or resources

Course Code:551568	HIGH PERFORMANCE COMPUTING	Credits:3	Hours:6
Objectives	➢ Gain knowledge about Cluster Computing and Grid Computing techniques. ➢ Learn about Cloud Computing, its deployment and Virtualization. ➢ Study cloud fundamentals		
Unit-I	**Cluster Computing:** Introduction to Cluster Computing, Scalable Parallel ComputerArchitectures, Cluster Computer and its Architecture, Classifications, Components for Clusters, Cluster Middleware and Single System Image, Resource Management and Scheduling, Programming Environments and Tools, Applications, Representative Cluster Systems, Heterogeneous Clusters, Security, Resource Sharing, Locality, Dependability, Cluster Architectures, Detecting and Masking Faults, Recovering from Faults, Condor, Evolution of Metacomputing		
Unit-II	**Load Sharing and Balancing:** Evolution, Job and Resource Management Systems, State-of-the-Art in RMS and Job, Rigid Jobs with Process Migration, Communication-Based Scheduling, Batch Scheduling, Fault Tolerance, Scheduling Problem for Network Computing, Algorithm -ISH, MCP and ETF, Dynamic Load Balancing, Mapping and Scheduling, Task Granularity and Partitioning, Static and Dynamic Scheduling.		
Unit-III	**Grid Computing:** Introduction to Grid Computing, Virtual Organizations, Architecture, Applications, Computational, Data, Desktop and Enterprise Grids, Data-intensive Applications, High-Performance Commodity Computing, High-Performance Schedulers, Grid Middleware: Connectivity, Resource and Collective Layer, Globus Toolkit, GSI, GRAM, LDAP, GridFTP, GIIS, Heterogeneous Computing Systems,		
Unit-IV	**Mapping Heuristics:** Immediate and Batch Mode, Immediate: MCT, MET, Switching Algorithm, KPB and OLB, Batch: Min-Min, Max-Min, Sufferage, Duplex, GA, SA, GSA, Tabu and A*, Expected Time to Compute Matrix, Makespan, Heterogeneity: Consistent, Inconsistent and Partially-Consistent, QoS Guided Min-Min, Selective Algorithm, Grid Computing Security, Introduction to GridSim, Architecture, Grid Resource Broker, Grid Referral Service.		
Unit-V	**Cloud Computing:** Introduction to Cloud Computing, Types: Deployment and Service Models, Characteristics, Applications, Service-Level Agreement, Virtualization, High-Throughput Computing: Task Computing and Task-based Application Models, Market-Based Management of Clouds, Energy-Efficient and Green Cloud Computing Architecture, Resource Allocation, Leases, Task Scheduling: RR, CLS and CMMS, Workflow Scheduling, Montage, Epigenomics, IPHT, LIGO, CyberShake, Task Consolidation, Introduction to Cloud Sim, Cloudlet, Virtual Machine and its Provisioning, Time and Space-shared Provisioning.		

Reference and Textbooks: -

R. Buyya.(2008).High Performance Cluster Computing: Architectures and Systems. Volume ,1
    Pearson Education.

(Edited By) I. Foster and C. Kesselman.(2004).The Grid: Blueprint for a New Computing
      Infrastructure, Morgan Kaufmann, Elsevier.

R. Buyya, C. Vecchiola and S. T. Selvi.(2013).Mastering Cloud Computing Foundations and
     Applications Programming, Morgan Kaufmann, Elsevier.

A.Chakrabarti.(2007).Grid Computing Security, Springer.

D. Janakiram.(2005). Grid Computing. Tata McGraw-Hill.	
S. R. Prabhu. (2008).Grid and Cluster Computing.PHI.	
B. Sosinsky.(2011).Cloud Computing Bible. Wiley.	
B. Wilkinson.(2009).Grid Computing: Techniques and Applications, CRC Press.	
Outcomes	➢ Familiar with Cluster Computing , Architecture, Tools, Detecting and Masking Faults, Recovering from Faults. ➢ Describe the basic concepts and principles of Cloud Computing ➢ Ability to program with cloud computing

Course Code: 551569	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	Credits:3	Hours:6
Objectives	- Study the concepts of Artificial Intelligence. - Learn the methods of solving problems using Artificial Intelligence. - Introduce the concepts of Expert Systems and machine learning.		
Unit-I	**Introduction to AI and Production Systems -** -Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.		
Unit-II	**Representation of Knowledge** - Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.		
Unit-III	**Knowledge Inference** - Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster – Shafer		
Unit-IV	**Planning and Machine Learning -** Basic plan generation systems – Strips - Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.		
Unit-V	**Expert Systems** – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells.		
Reference and Textbooks: -			

Reference and Textbooks: -

Dan W. Patterson.(2007).Introduction to AI and ES", Pearson Education.(Unit-III).

Deepak Khemani.(2013). Artificial Intelligence. Tata Mc Graw Hill Education.

Kevin Knight , Elaine Rich , B. Nair.(2017).ARTIFICIAL INTELLIGENCE,Third Edition

.McGraw Hill Education; 3 edition, (Units I,II,VI and V) ISBN-10: 9780070087705,

ISBN-13: 978-0070087705, ASIN: 0070087709

Peter Jackson.(2007). Introduction to Expert Systems. 3rd Edition, Pearson Education.

Stuart Russel and Peter Norvig.(2007). AI – A Modern Approach.2nd Edition, Pearson

Education.

Outcomes	- Identify problems that are amenable to solution by AI methods. - Formalise a given problem in the language/framework of different AI methods. - Implement basic AI algorithms.

Course Code: 551570	**CYBER SECURITY AND FORENSICS**	Credits:3	Hours:6
Objectives	➢ To learn various types of security threats present in Digital Data Transmission ➢ To learn how to collect evidence and investigate Cyber Crimes. ➢ To learn and analysis cyber crime evidences with Cyber Crime Tools		
Unit-I	**Cyber Security:** Introduction-Cyber Security Policy-Domains of Cyber Security Policy- Strategy vs Policy-Evolution of Cyber Security: Productivity-Internet-Ecommerce-Counter measures- Challenges-Cyber Security Metrics-Security management goals-counting vulnerabilities-security frameworks-security policy objectives.		
Unit-II	**Digital Securities:** Introduction, Types of Attacks, Digital Privacy, Online Tracking, Privacy Laws, Types of Computer Security risks (Malware, Hacking, Pharming, Phishing, Ransomware, Adware and Spyware, Trojan, Virus, Worms, WIFI Eavesdropping, Scareware, Distributed Denial-Of-Service Attack, Rootkits, Juice Jacking), Antivirus and Other Security solution, Password, Secure online browsing, Email Security, Social Engineering, Secure WIFI settings, Track yourself online, Cloud storage security, IOT security, Physical Security Threads.		
Unit-III	**Cyber Crime:** Introduction: Role of Electronic Communication Devices in Cyber Crime-Types of Cyber Crime-Cyber Crimes against individual, against property, against nation-Crimes associated with mobile Electronic Communication Devices-Classification of Cyber Criminals-Execution of Cyber Crime-Strategies to prevent Cyber Crime. Cyber Crime Classification: Cybercrime against individual-Cybercrime against property-Cybercrime against nation.		
Unit-IV	**Cyber Forensics:** Interrelation among cybercrime, cyber forensics, and cyber security-Cyber Forensics need, objectives, steps and methods involved in forensic analysis-Disk Forensics-Network Forensics-Wireless Forensics-Database Forensics-Malware Forensics-Mobile Forensics-GPS Forensics-Email Forensics-Memory Forensics-Building Forensic Computing Lab-Incident and Incident Handling-Computer Security Incident Response Team.		
Unit-V	**Digital Evidence**: Introduction to Digital Evidence and Evidence Collection Procedure-Sources of Evidence-Digital Evidence from Standalone Computers/Electronic Communication Devices-Operating Systems and their Boot Processes-Storage medium-File System-Windows Registry, Artifacts-Browser Artifacts-Evidence from mobile devices-Impediments to Collection of Digital Evidence-Challenges with Digital Evidence. Forensic Tools for Data Recovery-Forensic Tools for Password Password Recovery.		

Reference and Textbooks: -
Cyber Crime Investigation. (2013). DSCI –Nasscom.
Dejey, Murugan.(2018). Cyber Forensics. Oxford University Press.
Digital Forensics. (2012). DSCI – Nasscom.
Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, Marcus H. Sachs, Jeffrey Schmidt, Joseph
     Weiss.(2012).Cyber Security Policy Guidebook. Wiley Publication.
A Practical Guide By Nihad Hassan, Rami Hijazi, Apress.Digital Privacy and Security Using
     Windows.

Outcomes	➢ Able to identify security risks and take preventive steps ➢ Investigate cybercrime and collect evidences ➢ Able to use knowledge of forensic tools and software

CURRICULUM VITAE

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Educational qualification: M.Sc., M.Phil., M.C.A., M.Tech., Ph.D.

Professional experience: 32 years

Honours and Awards:

- Dr.Mohan Best Teacher Award-2011 received from TamilNadu college of Education, Nainarpuram, Sivaganga District.

Recent publications:

- "Satellite Impacts On Real Time Remote Sensing Applications-Technical Aspect" International Organization Of Scientific Research,Vol.8(7),ISSN: 2278-8719,47-53.

- "Energy Preserves Task Scheduling In Heterogeneous Virtual Machine Framework" International Journal Of Computer Science And Engineering(IJCSE), Vol 6. Issue .8, ISSN NO: 2347-2693.

- "Offloading Scheme For Cloudlets Computation Tasks" International Journal Of Computer Science And Engineering(IJCSE), Vol.6.Issue.8, ISSN No:2347-2693.

- "Bio-Enlivened Behavioural Investigation Of MANETs in Smart Cities" International Journal Of Computer Science And Engineering(IJCSE),Vol.6,Issue .9,ISSN No:2347-2693.

- "Advanced Technique of Improving Homomorphic Encryption Scheme Implementation into Cloud Computing" International Journal Of Emerging Technologies and Innovative Research(IJETIR), Vol.5 Issue.8, ISSN NO:2349-5162.

- "Priority based Mutual Exclusion Algorithm with Starvation Avoidance for MANET" Proceedings of the National Academy of Sciences, India Section A: Physical Sciences, SPRINGER (indexed by SCIMAGO),ISSN:0369-8203.

- "A Multilayered Back Propagation Algorithm to Predict Significant Attributes of UG Pursuing Students Absenteeism at Rural Educational Institution" International Journal of Computer Sciences and Engineering(IJCSE), E-ISSN: 2347-2693.

- "A Review On Different Analytics In IoT Big Data" International Journal Of Research And Analytical Reviews(IJRAR), ISSN NO: 2349-5138, Vol.5 Issue :12 .
- "Service Differentiation for Achieving Fairness in Multi-traffic Class in MANET" International Journal of Recent Technology and Engineering, SCOPUS, ISSN:2277-3878.
- "Optimum Buffer Node Selection for Queue Management using Honey Bee Algorithm in MANET" Published in Asian Network for Scientific Information(indexed in SCIMAGO & SCOPUS),ISSN:1992-1454

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CURRICULUM VITAE

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Educational qualification : M.Sc[ca], M.B.A., M.Tech., M.Phil., Ph.D.,

Professional experience : 29 Years

Honours and Awards:

- Best Citizens of India Award 2012 by International Publishing House, New Delhi

- Best Research Paper Award ICRICS 2017, International Conference, Hindusthan College of Arts and Science, Chennai.

Recent publications:

- C.V.Sheeba and Dr.T,Meyyappan and S.M.Thamarai," Improving the performance of Multiple document Summarization using Mead Extraction" International journal of advanced research in Basic Engineering sciences and Tehnology",vol.4,Issue.7,July 2018. INDEXING: Thomson Reuters' , Web of Science, ResearcherID, Google Scholar, SCOPUS.

- K.Padma and Dr.T.Meyyappan and SM.Thamarai," Improving privacy preserving against shilling Attack Recommender system" International journal of Advanced Research in Management, Architecture, Technology and Engineering", Vol.IV, Issue.VII, July 2018, ISSN:2454-9762, INDEXING: Google Scholar, American Soceity of Indexing.

- Sowndarya B, Meyyappan T,Thamarai S.M,"A Novel Methodology For Mining Frequent Itemsets From Temporal Dataset"

- Sheeba C.V, Meyyappan T, Thamarai S.M,"Improving The Performance Of Multiple Documents Summarization Using Mead Extraction" IJARBEST Scientific Publishers, Vol. 4, Issue. 07, July 2018, ISSN 2456-5717. Indexing: Copernicus.

- Banu Priya V, Meyyappan T,Thamarai S.M,"Page Ranking Algorithm For Ranking Web Pages" JCSE International Journal of Computer Sciences and Engineering, Vol. 6, Issue. 07, July 2018, E-ISSN 2347-2693.

- Saranya S, Meyyappan T,"Proposing A New Methodology For Weather Forecasting By Using Big Data Analytics" IJSRST, Vol. 4, Issue. 08, 2018, ISSN 2395-6011.

- Abdul Rahaman Wahab Sait, Arunadevi M, Meyyappan T, "A Survey On Techniques to Detect Mslicious Activites On Web" IJACSA International Journal of Advanced Computer Sciences and Applications, Vol. 10, No. 2, 2019. SCOPUS, WEB OF SCIENCE.

- J.Amutha and Dr.T.Meyyappan and SM.Thamarai, "Efficient nearest keyword set search in multi dimensional datasets using pruning algorithm" International journal of advanced research in Basic Engineering sciences and Tehnology,vol.4,Issue.7,July 2018, Web of Science, ResearcherID, Google Scholar, SCOPUS.

Cumulative Impact factor   : 20.11

Total Citation   202

h- index   8

i10- index   7

CURRICULUM VITAE

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Address	: Department of Computer Science Alagappa University,
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Educational qualification : M.Sc.,PGDCA.,PGDOR.,MCA., M.Phil., Ph.D

Professional experience : 29 Years

Honours and Awards:

- M.Sc(Maths), Madurai Kamaraj University Fourth Rank
- Distinction in M.Phil Computer Science

Recent publications:

- "New Approach for Reducing the Size of Ciphertext" International Journal of Scientific Research in Science and Technology, Vol. 4, Issue 8, June 2018, ISSN No. 2395-6011, pp.526-530.
- "Hamiltonian Approach for Finding Shortest Path" International Journal of Scientific Research in Science and Technology, Vol. 4, Issue 8, June 2018, ISSN No. 2395-6011, pp. 484-488.
- "A New Approach for Text Based Image Compression" International Journal of Scientific Research in Science and Technology, Vol. 4, Issue 8, June 2018, ISSN No. 2395-6011, pp. 489-492.
- "Linguistic Schemes Encoding Text Message" International Journal of Scientific Research in Science and Technology, Vol. 4, Issue 8, June 2018, ISSN No. 2395-6011, pp. 500-503.
- "A study of Crimes on Cyberspace" IOSR Journal of Engineering, Vol. 08, Issue 7 July 2018, ISSN No. 2278-8719, pp. 38-46.
- "Analysis of Social Networks" Journal of Computer Science and Engineering , Vol.4, Issue 7, July 2018, ISSN No. 2456-1843, pp. 1-6.
- "Comparative Analysis of various Data Mining Classification Algorithms using R Software" International Journal of Computer Science, Vol. 6, Issue 1,July 2018, ISSN No. 2348-6600, pp. 2190-2195.
- "Overview of Social Media Sentiment Analysis" International Journal of Research and Analytical Reviews,, Vol. 5, Issue 3/366, Aug. 2018, ISSN No. 2348-1269, pp. 846-854.
- "Insidious Vulnerabilities on Mobile Applications - Security Measures" IOSR Journal of Engineering (IOSRJEN), ISSN (e): 2250 - 3021, ISSN (p): 2278 – 8719, December,2018, pp 5-9.

- "Ultrasound Image Representation for systematic Learning" International Journal of Computer Sciences and Engineering", 6(12), 930-933, Dec. 2018,
- "Impact of Crypto-Mining Malware on System Resource Utilization" International Journal of Computer Sciences and Engineering, vol.7, issue 2, Feb. 2019, UGC Approved Journal .
- "Encryption System Preserving Plain Text Using Multiple Languages" Interciencia Journal, April (2019), 44(4), SCI, Journal.
- "Classification of Ultrasound Breast Cancer Images using Neural Learning and Predicting Tumor Growth Rate" Multimedia Tools And Apllication, ISSN : 1380 - 7501, pp. 1-19 April 2019,SCI Journal.

Cumulative Impact factor   : 66.2

Total Citation   228

h- index   05

i10- index   05

CURRICULUM VITAE

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Educational qualification : M.C.A., M. Phil., Ph. D

Professional experience : 14 Years

Honours and Awards:

- Passed UGC-NET in December 2003
- Got Gold Medal for M. C. A from Bharathidasan University
- Best outgoing student of M. C. A and first prize for Proficiency in Major in M. C. A

Recent publications:

- "Prediction of students performance using adaptive rule generation for influencing attribute based clusters" International Journal of Research and Analytical Reviews, vol. 5, issue 3, Aug 2018, pp. 939-944.

- "v-CSS: A Video Encryption Algorithm Based on Conversion, Shuffling and Substitution using Randomly Generated Grayscale Image" International Journal for Research in Engineering Application & Management, ISSN : 2454-9150, pp. 47-51, issue 12, vol. 4, March 2019.

- "Structuring of web pages using XML framework for Information Filtering" Asian Journal of Computer Science and Technology, Vol.8, No.S2, March 2019, pp.35-38.

- "Precision Data Acquisition and Analysis for Nutrient Management of Tomatoes" Asian Journal of Computer Science and Technology, Vol.8, No.S2, March 2019, pp.20-23

Cumulative Impact factor : -

Total Citation 104

h- index 05

i10- index 04

CURRICULUM VITAE

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Educational qualification   : M.Sc., M.Phil., M.Tech., Ph.D.

Professional experience   : 14 Years

Honours and Awards:

- Best Paper Award for paper publication by International Journal (TIJCSA)

Recent publications:

1. "A Study of Data Mining Techniques for Auto Immune Diseases" International Journal of Pure and Applied Mathematics. Volume 118 No. 9 2018, 1-4 ISSN: 1311-8080. (Scopus Indexed).

2. "Study and Analysis of Influential Node Tracking in Social Networks" International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 04 Apr-2018 e-ISSN: 2395-0056. (UGC Indexed).

3. "Study and Analysis of Infrequent Behaviour Patterns in Business Process Event Logs" International Journal of Computer Science and Mobile Computing Vol. 7, Issue. 4, April 2018, pg.191 – 194 ISSN 2320–088X. (UGC Indexed).

4. "A Study of Stress Caused By Social Interactions In Social Networks" International Journal of Computer Engineering and Applications, Volume XII, Issue V, May 18, ISSN 2321-3469. (UGC Indexed).

5. "Colony Collapse Disorder (CCD) in Honey Bees Caused by EMF Radiation" Journal of Bio Information 21st December 2018, 2018; 14(9): 521–524 ISSN: 0973-8894 (Web of Science, SCI Indexed).

Cumulative Impact factor : -

Total Citation   22

h- index   04

i10- index   0