ALAGAPPA UNIVERSITY

(A State University Established in 1985)

Karaikudi – 630003, Tamil Nadu, India

DEPARTMENT OF COMPUTER APPLICATION

M.C.A.

[Choice Based Credit System (CBCS)]

[For the candidates admitted from the academic year 2019-2020]

REGULATIONS AND SYLLABUS (2019-2020)

1. **Programme general objectives**

   The general objective of M.C.A (Master of Computer Applications) is to develop high quality graduates who possess programming and logical skills. It is designed to discover, investigate the requirements of a problem and find the solution to them using computing principles. Students will gain knowledge to create and evaluate a computer based system, components and process to meet the specific needs of applications, to utilize current techniques and tools necessary for complex computing practices and finally to develop and integrate effectively system based components into user environment.

2. **Programme Specific Objectives**
   - To identify the need and develop the skill required to become computing professional.
   - To execute effectively in a team environment to achieve a common goal.
   - To improve the proficiency in developing applications with required domain knowledge.
   - To classify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.

3. **Programme Outcomes**
   - Developing problem solving and programming skills in various computing fields of IT industries.
   - Widening the ability to plan, analyse, design, code, test, implement & maintain a software product for real time system.
   - Supporting students capability to set up their own enterprise in various sectors of computer industry.
   - Involving the students in developing system based applications and finding solutions for real time problems in various domains.
   - Preparing the students to pursue higher studies in computing or related disciplines.

4. Candidates for admission to the first year of the Master of Computer Applications **(M.C.A)** programme shall be required to have passed with a minimum of 60% marks in Part-III (minimum 55% marks for SC/ST candidates) in any one of the following examinations of any recognized University:

   B.Sc. Degree in Mathematics/Statistics/Applied Sciences/Computer Science/ Information Technology (or) B.Sc. Degree in Physics/Chemistry/ Electronics as major subject and Mathematics as ancillary subject (or) B.C.A./B.Com./B.B.A.(OR) qualification equivalent thereto. The candidate should have studied 10+2+3 pattern with Mathematics/Statistics/Business Mathematics in +2 level.

5. The M.C.A. programme shall extend over a period of three years consisting of six semesters. Each semester consists of minimum of 75 working days with 6 working hours per day.
6. The courses of study and the scheme of examinations are shown in the table.
7. The Semester Examinations of 3 hours duration will be conducted ordinarily in November and April of every academic year by the University in different courses according to the scheme given in the table. A candidate will be permitted to appear for the Semester examination in a particular course at the end of each semester as per the norms of the University.
8. Each theory course carries 4 credits / 5 credits with 75 marks in the Semester (University Examination) and 25 marks in the Internal Assessment and each Lab (Practical) course carries 3 credits with 75 marks in the Semester examination and 25 marks in the Internal Assessment.

9. Students may be allowed to take interdisciplinary courses in a semester offered by the other Departments as interdisciplinary courses with the advice of the course coordinator.

10. Each student has to register for at least 8 credits in the interdisciplinary courses during programme. The number of credits registered should not exceed 12 credits for the entire period of study.

11. The project work (one semester duration) is to be carried out in the VI Semester and the project report carries 15 credits. 75% for project evaluation (both Internal and External examiners) and 25% for Viva-Voce.

12. Each student should take 140 credits to complete M.C.A. programme.

    (a) The passing minimum for each course in a semester is 45% in the external examinations and 50% in aggregate by **combining** external and internal.

    (b) All the candidates who have passed the examinations in all the prescribed courses shall be eligible for the award of the Degree of Master of Computer Applications (M.C.A.)

    (c) A Candidate who has passed all the examinations in the first attempt within three years of admission shall be declared to have passed in First Class with Distinction provided he/she secures more than 75% marks in the aggregate.

    (d) A candidate who has passed all the examinations within SIX years of admission shall be declared to have passed in First Class provided he/she secures not less than 60% marks in the aggregate.

    (e) All other candidates who have passed all the examinations in the prescribed courses shall be declared to have passed in Second Class.

13. A student shall be permitted to continue the programme from I to VI semester irrespective of failure(s) in the courses of the earlier semesters. The candidate will qualify for the MCA degree only if he/she passes all the arrears courses with in a period of SIX years.

14. Results will be declared through the department after the completion of each Semester examination and the marks/grade certificate will be issued to the candidate by the Head of the Department.

15. The common CBCS regulations prescribed for the Departments by the Alagappa University will be followed in all respect.

16. The revised curriculum will come to effect from the academic year **2019-2020**.

Master of Computer Applications (M.C.A)

Sem	Course/Title	Course Code	Credit	Hours/ Week	Marks		Total
					Int	Ext	
I	Digital Computer Organization	541101	5	5	25	75	100
	C and Data Structures	541102	5	5	25	75	100
	Relational Database Management Systems	541103	4	4	25	75	100
	Discrete Mathematics	541104	4	4	25	75	100
	Computer Networks	541105	4	4	25	75	100
	Lab I : Data Structures & RDBMS Lab	541106	4	8	25	75	100
	Library			1	-	-	-
	Total		**26**	**30**	**-**	**-**	**600**
II	Object Oriented Programming and C++	541201	5	5	25	75	100
	Operating Systems	541202	4	4	25	75	100
	Accounting & Financial Management	541203	5	5	25	75	100
	Communication Skills	541204	4	4	25	75	100
	Lab II : C++ & Operating System Lab	541205	4	8	25	75	100
	NME – I		2	3	25	75	100
	*SLC – I	MOOCs	**EC**	**-**	**-**	**-**	**-**
	Library, Yoga and Career Guidance			1	**-**	**-**	**-**
	Total		**24+ EC**	**30**	**-**	**-**	**600**
III	Computer Graphics	541301	4	4	25	75	100
	Java Programming	541302	5	5	25	75	100
	Design and Analysis of Algorithms	541303	5	5	25	75	100
	Elective – I		4	4	25	75	100
	Lab III : Computer Graphics & Java Programming Lab	541304	4	8	25	75	100
	NME – II		2	3	25	75	100
	*SLC – II	MOOCs	**EC**	**-**	**-**	**-**	**-**
	Library, Yoga and Career Guidance			1	**-**	**-**	**-**
	Total		**24+ EC**	**30**	**-**	**-**	**600**
IV	Visual Programming with .NET	541401	5	5	25	75	100
	Data Mining and Warehousing	541402	4	4	25	75	100
	Software Engineering	541403	5	5	25	75	100
	Elective - II		4	4	25	75	100
	Elective - III		4	4	25	75	100
	Lab IV : Visual Programming Lab	541404	4	8	25	75	100
	Total		**26**	**30**	**-**	**-**	**600**
V	Digital Image Processing	541501	4	4	25	75	100
	Mobile Communications	541502	4	4	25	75	100
	Python Programming	541503	5	5	25	75	100
	Elective - IV		4	4	25	75	100
	Elective - V		4	4	25	75	100
	Lab V : Python programming Lab	541504	4	8	25	75	100
	SEMINAR			1			
	Total		**25**	**30**	**-**	**-**	**600**
VI	Project Work & Viva-Voce	541999	**15**	**30**	25	75	**100**
	Grand Total		**140 + EC**		**Total Marks**		**3100**

NME: Non Major Electives Course and **SLC**: Self Learning Course (MOOCs)

* Credits earned through Self Learning Courses (MOOCs) shall be transferred in the credit plan of the program as extra credits.

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ELECTIVE COURSES

Code No	Course Title
	Elective Group I
541551	Object Oriented Analysis and Design
541552	Software Project Management
541553	Software Testing Methodologies
	Elective Group II
541554	Network Management Systems
541555	Network Security
541556	Wireless Networks
	Elective Group III
541557	Machine Learning
541558	Embedded Systems
541559	Internet of Things (IOT)
	Elective Group IV
541560	Resource Management Techniques
541561	Soft Computing
541562	Cloud computing
	Elective Group V
541563	E-Commerce
541564	WAP and WML
541565	Big Data Analytics
	Elective Group VI
541566	C# and ASP .Net
541567	Middleware Technology
541568	R Programming

Non Major Electives

Semester	Course/Title	Course Code	Credit	Hours/ Week	Marks Internal	Marks External	Total
II	NME –I: Object Oriented Programming and C++		2	3	25	75	100
III	NME – II: Java Programming		2	3	25	75	100

Semester - I			
Course Code: 541101	**Digital Computer Organization**	**Credits:5**	**Hours:5**
Objectives	• To impart the knowledge in the field of digital electronics • To impart knowledge about the various components of a computer and its internals.		
Unit I	Number Systems: Binary, Octal, Decimal and Hexadecimal number systems – Conversion from one base to another base – Use of complements – binary arithmetic – Data Representation: Fixed Point Representations – Floating Point Representations – Numeric and Character codes, Other Binary Codes – Error detection codes. Boolean algebra and Combinational Circuits: Fundamental concepts of Boolean Algebra – De Morgan's theorems – Simplification of expressions – Sum of products and products of sums – Karnaugh map simplification — two level implementation of Combinational Circuits.		
Unit II	Combinational Circuits: Half Adder – Full Adder– Decoders – Encoders – Multiplexers – Demultiplexer. Sequential Circuits: Flip-flop's – Registers – Shift Registers – Binary Counters – BCD Counters – Memory Unit.		
Unit III	Basic Computer organization and design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction cycle – Memory reference instructions – Input output and Interrupt – Complete Computer Description – Design on Basic Computer – Design of Accumulator logic.		
Unit IV	Central Processing Unit: Introduction – General Register organization – Stack organization – Instruction formats – Addressing modes – Data transfer and manipulation – Program control.		
Unit V	Input – output organization: Peripheral devices – Input output interface – Asynchronous data transfer – Modes of transfer – Priority interrupt – DMA – IOP – Serial Communication. Memory organization : Memory Hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory – Virtual memory – Memory management hardware.		
Reference and Text Books: David Money and Harris Sarah L. 2012 *Digital Design and Computer Architecture*, Second Edition, ElsevierInc Donald Leach , Albert MalvinoandGoutamSaha, 2010, *Digital Principles and Applications*, 4/e, McGraw Hill. Morris Mano,2017,*Computer System Architecture*, Third Edition, Pearson William Stallings, 2016, Computer Organization &Architecture Designing for performance 10th Edition - Pearson.			
Outcomes:	➢ Design and realize the functionality of the computer hardware with basic gates and other components using combinational and sequential logic. ➢ Understand the importance of the hardware-software interface		

Name of the Course Teacher:**Mrs. G .Shanthi**

Semester - I			
Course Code: 541102	**C AND DATA STRUCTURES**	**Credits:5**	**Hours:5**
Objectives	➢ To design, implement and apply the basic C programming concepts. ➢ To understand the linear and non- linear data structures available in solving problems		
Unit I	Problem Solving with Computers: Algorithms, and Flowcharts. Data types, constants, variables, operators, data input and output, assignment statements, conditional statements, Iteration, arrays, strings processing		
Unit II	Defining function, types of functions, function prototype, passing parameters, recursion, Storage class specifiers, pre-processor, header files and standard functions. Pointers: Definition and uses of pointers, pointer arithmetic, pointers and array, pointers and functions, pointer to pointer. Structures, union, pointers to structures, user-defined data types, enumeration		
Unit III	Linear Data Structures: List Abstract Data Types (ADTs), List ADT, array-based implementation, linked list implementation, singly linked lists, circularly linked lists, doubly-linked lists, applications of lists, Polynomial Manipulation, All operation (Insertion, Deletion, Merge, Traversal) Linear Data Structures: Stacks, Queues Stack ADT, Evaluating arithmetic expressions, other applications, Queue ADT, circular queue implementation, Double ended Queues, applications of queues.		
Unit IV	Non-linear Data Structure Trees, Binary Trees, Types of Binary trees, Binary Tree Representation, Traversing Binary Trees, Binary Search tree, Insertion and Deletion operations, Hashing Techniques		
Unit V	Sorting, Searching and Hash Techniques Sorting algorithms: Insertion sort, Selection sort, Shell sort, Bubble sort, Quick sort, Merge sort, Radix sort. Searching: Linear search, Binary Search Hashing: Hash Functions, Separate Chaining, Open Addressing, Rehashing, Extendible Hashing.		
Reference and Text Books:			
Balagurusamy .E, 2016, Programming in ANSI C, Seventh Edition, Tata McGraw-Hill Publishing Company Ltd. Brian W. Kernighan and Dennis M. Ritchie, 2012,The C Programming Language, 2nd Edition, PHI. Jacqueline Jones, Keith Harrow , 2011,Problem Solving with C, 1st Edition, Pearson Mark Allen Weiss, 2014, Data Structures and Algorithm Analysis in C, 4thEdition, Pearson Education. Rajaraman.V, 2013, Computer Programming in C, PHI. Seymour Lipschutz, VijayalakshmiPai .G.A., 2011,Data Structures,2ndEdition, Schaum's Outlines, Tata Mc-Graw Hill Private Ltd. Stephen G. Kochan Programming in C , III Edition, 8th Edition,PearsonEductaion Vikas Gupta, 2013,Computer Concepts and C Programming, Dreamtech Press			
Outco mes	• To write programs using structures, strings, arrays, pointers and strings for solving complex computational problem. • Using the data structures real time applications, able to analyse the efficiency of Data Structure.		

Name of the Course Teacher:**Dr. A. Nagarajan**

Semester – I			
Course Code: 541103	**RELATIONAL DATABASE MANAGEMENT SYSTEMS**	**Credits:4**	**Hours:4**
Objectives	• To understand the fundamentals of data models • To make a study of SQL and relational database design. • To know about data storage techniques an query processing. • To impart knowledge in transaction processing, concurrency control techniques and External storage		
Unit I	Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor. History of Data base Systems - Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.		
Unit II	introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying / altering Tables and Views. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus		
Unit III	Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.		
Unit IV	Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.		
Unit V	Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure. Dynamic Content: Big Data - Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.		

Reference and Text Books:	
Abraham Silberschatz, Henry Korth.F,Sudarshan.S,2013,*Data base System Concepts*, 6th Edition, Indian Edition, Tata McGraw Hill. Chris Eaton, Dirk deroos et al., 2012. "*Understanding Big data*", McGraw Hill. Garcia-molina, 2013,"*Database Systems - The Complete Book*", 2e, Dorling Kindersley India. Raghurama Krishnan, Johannes Gehrke,2014,*Data base Management Systems*,3e TATA McGrawHill. RamezElmasri, ShamkantNavathe.B, 2001 "*Database Systems, Models, Language, Design and Application Programming*, 6e. SharadMaheshwariRuchinjain, 2016,"*Database Management Systems: Complete Practical Approach*", 2e, Laxmi Publications.	
Outcomes:	• Design a database using ER diagrams and map ER into Relations and normalize the relations • Acquire the knowledge of query evaluation to monitor the performance of the DBMS. • Develop a simple database applications using normalization.

Name of the Course Teacher:**Dr. K. Mahesh**

Semester – I			
Course Code: 541104	**DISCRETE MATHEMATICS**	**Credits:4**	**Hours:4**
Objectives	• To understand the concepts and operations Set theory, Graph Theory • To understand and apply the Mathematical Logic in computer science.		
Unit I	Mathematical Logic: Statements and Notation - connectives - normal forms - The theory of inference for the statement calculus - The predicate calculus - Inference theory and predicate calculus		
Unit II	Set theory: Sets - Basic concepts - notation - inclusion and equality of sets - the power set - relations and ordering - properties - relation matrix and graph of a relation - partition - equivalence and compatibility relations - composition – partial ordering - partially ordered set. Functions - definition - composition – inverser - binary and n-ary operations - characteristic function - hashing function.		
Unit III	Algebraic Structures: Algebraic Systems: Examples and General Properties - Semigroups and Monoids: Definitions and Examples - Homomorphism of Semigroups and Monoids - Subsemigroups and Submonoids - Groups: Definitions and Examples - Cosets and Lagrange's Theorem - Normal Subgroups - Algebraic Systems with two Binary Operations		
Unit IV	Graph theory: Basic concepts - definition - paths - reachability and connectedness - matrix representation of graphs - trees.		
Unit V	Finite Probability – Probability Distributions – Conditional Probability Independence – Bayes' Theorem – Mathematical Expectation.		
Reference and Text Books: BernandKolman, RobertyBusby.C, Sharn Cutter Ross, 2006, *Discrete Mathematical Structures*, Pearson Education. Judith L. Gersting,2003,*Mathematical Structures for Computer Science*, 5thEdition,Freeman.W.H and Company,(Unit V) Ramasamy, 2006*, Discrete Mathematical Structures with application to combinatorics*, Univeristies Press. Richard Johnsonbaugh, 2001, *Discrete Mathematics, Fifth Edition*, Pearson Education. Tremblay.J.P and Manohar.R, 1975, *(Discrete mathematical structures with applications to Computer Science)*, Mc.Graw Hill Book Company, New York, (unit I to IV) Venkatraman.M K, Sridharan.N and Chandrasekaran.N, 2000, *Discrete Mathematics, The National Publishing Company.*			
Outcomes	• Acquire the basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems • Acquire the knowledge of logical operations and predicate calculus needed for computing skill • Able to design and solve Boolean functions for defined problems		

Name of the Course Teacher:**Dr. B. Yasodara**

Semester – I			
Course Code: 541105	**COMPUTER NETWORKS**	**Credits:4**	**Hours:4**
Objectives	• To understand networking concepts and basic communication model • To understand network architectures and components required for data communication.		
Unit I	Building a Networks - Requirements - Layering and protocols - Internet Architecture- Line configuration - Topology - Transmission Modes - Categories of Network: LAN, MAN, WAN - Layering and protocols- OSI Layer. Physical Layer: Analog and Digital Signals Performance - Transmission Media**.**		
Unit II	Data Link Layer: Internet Architecture – Network software – Performance ; Link layer Services,Error Detection and correction – Introduction – Block Coding – Cyclic Redundancy Check – Framing – Flow and error Control – Data link layer protocols: stop - wait protocol and sliding window protocol -. Multiple Access Protocols: ALOHA – CSMA – CSMA/CD – CSMA/CA.		
Unit III	Network Layer: Circuit switching - packet switching - message switching - Virtual circuit and Datagram subnets - Routing algorithm : Static routing -shortest path routing, Flooding, Flow based routing - Dynamic routing - distance vector routing, link state routing - Hierarchical routing, Broad cast, Multi cast routing - Congestion Control Algorithms-Qos.		
Unit IV	Transport Layer: Process to process delivery – UDP – TCP - Connection oriented Vs connectionless services. Applications and services: Remote Logon – Mail Exchange - File Transfer - Remote Procedure Call - Remote File Access – Traditional applications **-**Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP.		
Unit V	Network Security – Cryptography – Encryption model – Transposition and Substitution Chipers– Symmetric key cryptography: DES – AES – Asymmetric key cryptography: RSA – Security services-El Gamal Cryptosystem- Elliptic Curve		
Reference and Text Books: Andrew Tanenbaum.S, 2012, *Computer Networks*, 5e, Pearson Education, . BehrouzForouzan.A, 2017*, Data Communications and Networking*, TMH, 4e. Keshav.S, 2019*, An Engineering Approach to Computer Networks*, 5e,Pearson Education, Peterson.L, Bruce S.Davie, 2011, *Computer Networks: A Systems Approach*, 5e, Morgan Kaufmann Publishers. William Stallings, 2013, *Data and Computer Communications*, 10e, Prentice Hall.			
Outcomes	• Able to understand the working principles of various application protocols • Acquire knowledge about security issues and services available		

.   Name of the Course Teacher:**Dr. V. Palanisamy**

	Semester – II		
Course Code : 541201	**OBJECT ORIENTED PROGRAMMING AND C++**	**Credits:5**	**Hours:5**
Objectives	• To understand the concept of data abstraction and encapsulation, inheritance and virtual functions implement dynamic binding with polymorphism. • To learn how to design and implement generic classes with C++ templates. • To learn how to use exception handling in C++ programs.		
Unit I	**Introduction**: Differences Between C And C++, The Object Oriented Technology , Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of OOP Structure of A C++ Program, Header Files And Libraries **Input and Output C++** : Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data, Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators. Basic concept in C++ programming: Operators, control structures, functions, overloading, and recursion Tokens in C++, Variable Declaration and Initialization, Data Types, Operators in C and C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision of Decision Statements, Control Loop Statements.		
Unit II	Functions in C++ : Introduction, Structure Of Function, Passing Arguments, Lvalues And Rvalues, Return By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles Of Function Overloading, Recursion. Classes and Objects: Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member function, memory allocation for objects, array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function. Object Initialization: Introduction - constructors, default constructor, parameterized constructors and multiple constructors in a class, dynamic initialization through constructors, copy constructor, dynamic constructor and destructor. Dynamic Objects: Introduction, pointers to objects, array of pointers to objects, this pointer.		
Unit III	Inheritance: Derived Class – Virtual Functions –Polymorphism - Abstract Base Class – Types of Inheritance.		
Unit IV	Introduction, File Stream Classes, File Opening Modes, File Pointers And Manipulators, Manipulators With Arguments, Sequential Access Files, Binary And ASCII Filesrandom Access Operation, **Programming with Templates**: Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates, Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates And Inheritance, Container Classes , Types Of Containers, Container Adaptors, Iterators.		
Unit V	Introduction – Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors, handling uncaught exceptions, exceptions in operator overloaded functions, exception in inheritance tree, exceptions in class templates, memory allocation failure exception.		
Reference and Text Books: Ashok Kamthane.N, 2013,*Programming In C++*, 2nd Edition, Pearson education,			

BjarneStroustrup, 2013,"*The C++ Programming Language*", Fourth Edition, Addison Wesley.

Balagurusamy.E, 2017,*Object Oriented Programming with C++* , 7th Edition, Tata McGraw Hill
Publishing Co.

Rajaram.R, 2013.*Object Oriented Programming in C++,* Fifth Edition, New Age International
Publishers, New Delhi.

Robe Lafore,2012,*Object Oriented Programming in C++,* Fourth Edition, Galgotia Publications Pvt.
Ltd., New Delhi

SouravSahay, 2012,*Object Oriented Programming with C++,* 2nd edition, OXFORD,

Outcomes	- Able to understand and design the solution to a problem using object-oriented programming concepts. - Understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Name of the Course Teacher:**Dr. A. Nagarajan**

	Semester-II		
Course Code: 541202	**OPERATING SYSTEMS**	**Credits: 4**	**Hours: 4**
Objectives	• Understood the operating system principles • Understood the Principles of Deadlock, processor scheduling and memory management.		
Unit I	**Introduction:** Definition of Operating System – Computer System Organization – Computer System Architecture – Operating System Structure – Operating System Operations. **Operating System Structures:** Operating System Services – System Calls – System Programs – Operating System Design and Implementation.		
Unit II	**Process Management:** Process Concept – Process Scheduling – Operations on Processes – Inter Process Communication. **Process Synchronization:** The Critical Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors		
Unit III	**CPU Scheduling:** Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling. **Deadlocks:** Deadlocks Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection –Recovery from Deadlock.		
Unit IV	**Memory Management:** Swapping – Contiguous Memory Allocation – Segmentation – Paging. **Mass Storage Structure:** Overview of Mass Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management.		
Unit V	File Concept – Access Methods – Directory and Disk Structure – File – System Mounting – File Sharing – Protection. **File System Implementation:** File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free Space Management.		
Reference and Text Books: Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, 2013,"*Operating System Concepts*", 9th Edition, Wiley India Edition, Bhatt.P.C, 2013,"*An Introduction to Operating Systems: Concepts and Practice (GNU/Linux)*", 4th Edition, Prentice Hall India Learning Private Limited.			
Outcomes	• Able to understand the operating system components and its services • Implement the algorithms in process management and solving the issues		

Name of the Course Teacher:**Dr. P. Eswaran**

Semester-II			
Course Code: 541203	**ACCOUNTING AND FINANCIAL MANAGEMENT**	**Credits:5**	**Hours :5**

Objectives	• To understand the process of estimating the cost of a particular product. • To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets
Unit I	Financial Accounting: Meaning and Scope – Principles – Concepts – Conventions – Accounting process: Journal - Ledger – Trail Balance – Trading Account – Profit and Loss Account – Balance Sheet – Accounting Ratio Analysis – Funds Flow Analysis –Cash Flow Analysis – Computerized account.
Unit II	Cost and Management Accounting: Meaning Scope and uses of cost and management accounting – Elements of Cost – Cost Sheet – Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis: Concept, Applications and Limitations
Unit III	Standard Costing and budgeting: Concept and importance standard costing - Variance Analysis – Material – Labor – Overhead – Sales – Profit Variances - Budgets and Budgetary Control – Meaning and Types of budgets – Sales Budget – Production Budget – Cash Budget – Master Budget – Flexible budgeting – Zero Base Budgeting
Unit IV	Financial Management: Objective and Functions of Financial Management – Risk – Return Relationship –Time Value of Money – Capital Budgeting: Basic Methods of Appraisal of investments – Concepts of working Capital - Factors Affecting working Capital – Estimation of working capital requirements.
Unit V	Cost of Capital, Capital Structure and Dividend: Meaning and types of Cost of Capital – computation of cost for debt and equity sources of capital and weighted average cost of capital – Meaning and types of capital structure – determinants of capital structure – types of Dividend Policy – Types of Dividend decision.
Reference and Text Books:	
Chand.S, 2016, *Advanced Accounts Vol. II* by Shukla,M.C, Grewal.T.C&Gupta.S.C Maheswari.S.N, 2003, *Sultan Chand & Sons, Financial and Management Accounting*. Pandey I M, 2002, *Financial Management*, 4th Edition, Vikas Publications.	
Outcomes	• Able to understand the balance sheet preparation and do analysis • Able to understand the budget preparation and control of a company

Name of the Course Teacher:**Dr. T. Menaka**

Semester-II				
Course Code: 541204	**COMMUNICATION SKILLS**		**Credits:4**	**Hours:4**
Objectives	• To enable the students to learn the basics of communication skills • To acquire knowledge in soft skills and Group discussion.			
Unit I	Communication vs. Effective Communication, Importance and Significance of Communication, Principles of Effective Communication, The Flow of Communication, The Levels of Communication, Types of Communication-Verbal & Non-verbal, Barriers to Effective Communication – How to Get Rid of Them			
Unit II	Conversation Skills & Basic Etiquettes, Modes of Greeting, Requesting, Thanking, Writing, Introducing, Congratulating, Giving Opinion and Granting Permission, Expression of Agreement, Disagreement, Giving Orders, Advice, Suggestion, Apology, Warning and Gratitude etc. Telephone Conversation – Dos and Don'ts (Specific dialogues to be given to enable the students understand and use the expressions in conversations)			
Unit III	Presentation Skills, Preparing, Planning and Presenting a Talk. Preparing for the Introduction, Body and Conclusion of Presentation Structure, Language and Delivery of the Presentation, How to Make an Impressive Presentation? Analysing Audience and Locale, The Use of Audio-Visual Aids.			
Unit IV	Group Communication, Behaviour Pattern-Peer Group-Cooperation-Analysis of the Given Topic. Arguments and Force of Expressions - Avoiding Interference and Rudeness of Language – Guiding the Group Members at points of dullness – Leadership Qualities – Summing Up.			
Unit V	Writing Skills, Writing Letters, The Essentials of Letters, Writing Job Applications,Preparing a Resume and Resume Types, Types and Uses of Memos and Circulars, Advantage and Disadvantage of E-mail, Advantage and Disadvantage of Advertisements.			
Reference and Text Books: Bill R. Swetmon, *Communication Skills for the 21st Century*, Chennai: Eswari Press, First South Asian Edition, 2006. Dutt, Kiranmai&GeethaRajeevan, *Basic Communication Skills*, Rev. Ed. Foundation books Pvt. Ltd, Cambridge House, New Delhi, 2006. Meenakshi Raman, Sangeta Sharma, 2004,*Technical Communication-Principles and Practice,* Oxford University Press, New Delhi .				
Outcomes:	• Understood the basics of communication skills and soft skills • Acquired knowledge in presentation skills			

Name of the Course Teacher:**Mr. A. SaravanaMuthu**

Semester-III			
Course Code:541301	**COMPUTER GRAPHICS**	**Credits:4**	**Hours:4**
Objectives	• To understand computational development of graphics • To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.		
Unit I	**Introduction:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.		
Unit II	**2-D geometrical transform:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.		
Unit III	**3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.		
Unit IV	**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.		
Unit V	**Visible surface detection methods:** Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods. Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.		
Reference and Text Books: Donald Hearn and Pauline Baker.M, 2011,*Computer Graphics C version*, 2nd Edition Pearson Education David F Rogers, 2012 ,*Procedural Elements for Computer Graphics*, 2nd edition, Tata McGraw Hill. Foley, Van Dam, Feiner and Hughes, 2004, *Computer Graphics Principles and Practice*, 3rd Edition in C, Pearson Education. Steven Harrington, 2014, *Computer Graphics: A Programming Approach*, 2nd edition, Tata McGraw Hill.			
Outcomes:	• Enhance the perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information. • Able to develop interactive animations.		

Name of the Course Teacher:**Dr. P. Prabhu**

Semester-III			
Course Code: 541302	**JAVA PROGRAMMING**	**Credits: 5**	**Hours: 5**
Objectives	• To provide an overview of working principles of web related functionalities • To understand and apply the fundamentals core java, packages, database connectivity for computing		
Unit I	Fundamentals of Object-Oriented Programming: - Basic concepts of OOP – Benefits – Applications Java Evolution: Features – how java differs from C and C++ - java and internet- java support system – java environment - Overview of Java Language –constants variables and data types- Operators and Expressions - Decision Making and Branching - Looping		
Unit II	Classes, Objects and Methods: - Defining a class –fields –methods –creating objects – accessing class members – constructors – methods overloading –static members – nesting of methods – Inheritance –overriding methods –final variables-classes – methods- Arrays, Strings and Vectors :One dimensional Arrays –creating of array – Two dimensional arrays- strings –vectors –Wrapper classes – Enumerated Types - Packages: Defining interface –Extending interfaces – Implementing Interfaces.		
Unit III	JDBC Overview - Connection Class –Meta Data Function –SQL Exception– SQLwarning - Statement –Result Set - Other JDBC Classes.		
Unit IV	Inet Address - TCP/ IP client sockets - TCP/ IP server sockets - URL – URL Connection - Datagrams - Client/ Server application using RMI.		
Unit V	JApplet - Button - Combo - Trees - Tables – Panes. Introduction to AWT - Working with windows, Graphics, Text using AWT Controls and Layout managers.		
Reference and Text Books: Balagurusamy.E, 2011, 5e, Tata McGraw-Hill. Herbert Schildt, 2017, *"Java Programming with Java -The Complete Reference"*, 9E, McGraw-Hill. Krishnamoorthy.R and Prabhu.S, 2004, *Internet and Java Programming*, New Age International Publishers Wigglesworth and Wandra, 2011, "*Java Programming Advance Topics*", 3e, Cengage.			
Outcomes	• Able to understand the internet standards and recent web Technologies • Able to implement, compile, test and run Java program, • Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API		

Name of the Course Teacher:**Dr. M. Vanitha**

Semester-III			
Course Code : 541303	**DESIGN AND ANALYSIS OF ALGORITHMS**	**Credits:5**	**Hours:5**
Objectives	• To get a clear idea about the various algorithm design techniques • Using the algorithms in real time applications to able to analyze the efficiency of algorithm.		
Unit I	Introduction: What is Algorithm? – Fundamentals of Algorithmic problem solving – important problem types – Fundamentals of Analysis of Algorithm efficiency – Mathematical Analysis of Non Recursive Algorithms - Mathematical Analysis of Recursive Algorithms – Algorithm for Computing Fibonacci Numbers – Empirical Analysis of Algorithms.		
Unit II	Brute Force – Selection Sort, Bubble sort, Sequential Search – Closet-Pair and Convex-Hull Problems-Depth first search and Breadth first search – Divide and Conquer – Merge sort, Quick sort , Binary Search, Strassen's matrix multiplication.		
Unit III	Dynamic Programming – General Method – Computing a Binomial Coefficient – Warshall's and Floyd's Algorithms- Optimal Search Binary trees – Knapsack Problem – Greedy Technique - General Method, Applications - Prim's Algorithm, Kruskal's Algorithm, Dijikstra's Algorithm.		
Unit IV	Decrease and Conquer – Insertion sort – Depth First Search, Breadth First Search - Topological Sorting – Algorithm for generating Combinatorial Objects. Transform and Conquer – Presorting – Heap and Heap sort – Problem Reduction – Computing Least Common Multiple – Counting Paths in a Graph- Reduction of Optimization Problem – Reduction to Graph Problems.		
Unit V	Back Tracking – General Method – 8 Queen's Problem – Sum of Subsets – Graph Colouring – Hamiltonian cycle – Branch and Bound – General Method – Assignment Problem - Knapsack problem – Travelling Salesman Problem. P, NP and NP-complete Problems		
Reference and Text Books: AnanyLevitin, 2012. *Introduction to Design and Analysis of Algorithms*, Pearson education, 3e. Sridhar .S,1e, *Design and Analysis of Algorithms*, 2014 oxford university press. Lee.R.C.T, Shian-Shyong Tseng, Ruei-Chuan Chang, Tsai.Y.T,2005, *Introduction to the Design and Analysis of Algorithms: A Strategic Approach*, McGraw-Hill			
Outcomes:	• Able to apply the algorithm design techniques to any of the real world problem. • Able to write efficient algorithm for a given problem and able to analyze its time complexity		

Name of the Course Teacher:**Mrs. G. Shanthi**

Semester-IV			
Course Code : 541401	**VISUAL PROGRAMMING WITH .NET**	**Credits: 5**	**Hours: 5**
Objectives	▪ To develop an understanding of Visual Basic .Net ▪ To develop the skills necessary to create software solutions using VB with .Net ▪ To learn how to analyze certain types of problems with a software solution in mind		
Unit I	Introduction - What Is Visual Studio? - Navigating the Visual Studio - The Menu – Toolbar - Work Area - Toolbox - Solution Explorer - Status Bar - Managing VS Windows - Visual Studio Project Types - Windows Projects - Web Projects - Office Projects - SharePoint Projects - Database Projects.		
Unit II	C# or VB.NET - Basic Syntax - Code Skeleton - The Main Method - The Program Class - The FirstProgram Namespace - VS Code Editor - Class and Member Locators – Bookmarks - Running Programs - Primitive Types and Expressions - Enums - Branching Statements - Loops - Creating Classes - Class Inheritance – Class Snippet - Writing Methods - Parameters Passing - Returning Data - Method Snippets - Coding Fields and Properties - Declaring and Using Properties - The Property Snippet.		
Unit III	Understanding Delegates and Events - Events - Delegates - Handler Code - Implementing Interfaces - The interface Snippet - Applying Arrays and Generics - Creating and Building Projects - Constructing Solutions and Projects - Navigating the Solution Explorer - Examining Property Settings - Assembly Name - Default Namespace - Target Framework - Output Type - Startup Object - Icon and Manifest - Compiling Applications - Rebuilding Solutions/Projects - Cleaning Solutions/Projects - Managing Dependencies, Compilation Settings - Navigating with Class View - Using the Class Designer - Class Designer Code Generation		
Unit IV	Debugging with Visual Studio - Breakpoints - Stepping Through Code – Inspecting Application State - Locals and Autos Windows - Watch Windows - The Immediate Window - The Call Stack Window - The Quick Watch Window - Watching Variables with Pin To Source - Working with IntelliTrace - Working with Databases - Server Explorer - Creating a Database - Adding Tables - Relating Tables with Foreign Keys - Adding Stored Procedures - Configuring Database Options.		
Unit V	Building Programs with VS 2010 - Building Desktop Applications with WPF - Starting a WPF Project - Understanding Layout - Grid Layout – Stack Panel Layout - DockPanel Layout - WrapPanel Layout - Canvas Layout - Creating Web Applications with ASP.NET MVC - Designing Silverlight Applications - Deploying Web Services with WCF. **Dynamic Content:** Features of Visual studio 2017 - Windows Presentation Foundation (WPF) Architecture - Building applications using Universal Windows Platform (UWP) Tools.		
Reference and Text Books: Andrew Moore, *Visual Studio 2010 All-in-One For Dummies*, Weiley Publishing Joe Mayo, 2010, *Visual Studio 2010 - A Beginner's Guide,* Tata McGraw Hill Edition KunalChowdhury 2017,*Mastering Visual Studio*, kindle edition and published by Packt Nick Randolph, David Gardner, *2010*,*Professional Visual Studio ,* Wiley Publishing			
Outcomes:	➢ Able to understand and design the solution to a problem using VB. Net ➢ Understand and implement the features of .Net for providing programmed solutions to complex problems		

Name of the Course Teacher:**Dr. M. Vanitha**

Semester-IV			
Course Code : 541402	**DATA MINING AND WAREHOUSING**	**Credits:4**	**Hours:4**
Objectives	• This course presents on depth of to data mining techniques; association rule, clustering, classification, web mining, temporal and sequential data mining and provide a practical exposure using data mining tool orange. • To enable the students to learn the basic functions, principles and concepts of Data Mining		
Unit I	**Data Warehousing** Introduction – Definition-Multi Dimensional Data Model-OLAP operations-Warehouse Schema - Data Modeling tools – Fact tables and dimensions - Warehouse Architecture -Warehouse server-. Meta Data – OLAP Engine-Backend Process: Data Extraction, cleaning, Transformation and loading - Data warehousing case studies: Data warehousing in Government, Tourism, Industry and Genomics data.		
Unit II	**Data Mining fundamentals** - Definition – KDD vs. Data Mining- KDD steps: Data selection, cleaning, Integration, Transformation, Reduction and Enrichment-DM Techniques –Issues and Challenges in Data Mining-application areas: types of data – Data Mining Applications- current trends affecting data mining – Data Preprocessing - Exploration: Summary statistics – Visualization		
Unit III	**Association rules:** Introduction – Methods to discover association rules – Apriori algorithm - Partition Algorithm – Pincer search algorithm – Dynamic Item set Counting algorithm – FP-Tree Growth algorithm. Classification: Decision Tree classification – Bayesian Classification – Classification by Back Propagation.		
Unit IV	**Clustering Techniques:** Introduction – Clustering Paradigms – Partitioning Algorithms: K means & K Medoid algorithms – CLARA – CLARANS – Hierarchical clustering – DBSCAN – BIRCH – Categorical Clustering algorithms – STIRR – ROCK – CACTUS. Introduction to machine learning – Supervised learning – Unsupervised learning – Machine learning and data mining. Neural Networks: Introduction – Use of NN – Working of NN - Genetic Algorithm: Introduction –Data Mining using GA.		
Unit V	**Web Mining and Big Data:** Introduction –Web content mining – Web structure mining –Web usage mining –Text mining –Text clustering – Visual data mining – Various mining tools and techniques for implementation using weka, Rapidminer and Matlab.Introduction to Big Data Analytics – Data Analytics – Analytics Terminology –Types of Analytics – Analytics Life Cycle - Data Store.		

Reference and Text Books:

ArunPujari.K, "*Data Mining Techniques*", University press(India) Pvt Limited, 2015.

Jiawei Han, Jian Pei and MichelineKamber, 2016, *Data Mining: Concepts and Techniques*, 3e, Morgan Kaufmann.

Lakshmi Prasad.Y, *Big Data Analytics*, 1st Edition, Notion Press, 2016.

Margaret H Dunham, 2008, *Data mining - Introductory and advanced topics*, Pearson Education.

Outcomes:	• Understand the data mining techniques, classification and web mining • Acquire knowledge in clustering techniques

Name of the Course Teacher: **Dr.K. Mahesh**

Semester-IV			
Course Code :541403	**SOFTWARE ENGINEERING**	**Credits:5**	**Hours:5**
Objectives	- To understand and practice the various fields such as analysis, design, development, testing of Software Engineering. - To develop skills to construct software of high quality with high reliability. - To apply metrics and testing techniques to evaluate the software. - To know about AGILE technology.		
Unit I	**Introduction:** Role of software, Software myths. **Generic view of process:** A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, Process assessment, Personal and Team process models. **Process model:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.		
Unit II	**Requirement Engineering:** Design and Construction, Requirement Engineering Tasks, Requirements Engineering Process, Validating Requirements. **Building the Analysis Model:** Requirement analysis, Data Modeling concepts, Object-Oriented Analysis, Scenario-Based Modeling, and Flow-Oriented Modeling Class-Based Modeling, Creating a Behavioral Model.		
Unit III	**Design Engineering:** Design process and quality, Design concepts, The Design model. Architectural Design: Software architecture, Data design, Architectural styles and patterns, Architectural Design. **User interface design:** The Golden rules, User interface analysis and design, Interface analysis, Interface design steps, Design evaluation		
Unit IV	**Testing Strategies:** Approach to Software Testing, Unit Testing, Integration Testing, Test strategies for Object-Oriented Software, Validation Testing, System Testing, the art of Debugging, Black-Box and White-Box testing. **Product Metrics:** Software Quality, Product Metrics, Metrics for Analysis Model, Design Model, Source code and Metrics for testing, Metrics for maintenance. **Metrics for Process and Projects Domains:** Software Measurement, Metrics for Software Quality and Software Process.		
Unit V	**Quality Management and AGILE technology:** Quality concepts, Software quality assurance, Software Reviews, Formal Technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards. Agile and its significance: Agile Story - Evolutionary delivery ,Scrum Demo, Planning game, Sprint back log, adaptive planning, Agile Motivation – Problems With The Waterfall - Research Evidence, Scrum : Method Overview, Life cycle phases and Work product roles and practices-Agile methodology - Extreme Programming: Method Overview, Life cycle phases and Work product roles and practices, Agile Project management, Agile Environment, Agile Requirements-Agility and quality assurance - Agile product development – Agile Metrics – Feature Driven Development (FDD), Agile approach to Quality Assurance, Test Driven Development – Agile approach in Global Software Development.		
Reference and Text Books: Craig Larman, 2006 "*Agile and Iterative Development – A Manager's Guide*", Pearson Education. Ian Sommerville, 2011 *"Software Engineering: For VTU"*, 8e Pearson Education. Lisa Crispin, Janet Gregory, Mike Cohn, Brain Marick, 2009 "*Agile Testing: A practical guide for Testers and Agile Teams*", Addison-wesley publication. Rod Stephens, 2015 "*Beginning Software Engineering*", Wrox,. Roger Pressman.S and Bruce Maxim.R, "*Software Engineering, A practitioner's Approach*", Tata McGraw-Hill,8th Edition,2014.			

Outcomes	• Able to understand the problem domain for developing various models of software Engineering.
	• Able to measure the product and process performance using various metrics.
	• Able to evaluate the system with various testing techniques and strategies.

Name of the Course Teacher:**Dr. P. Eswaran**

Semester-V			
Course Code 541501	**DIGITAL IMAGE PROCESSING**	**Credits:4**	**Hours:4**
Objectives	- Learn digital image fundamentals. - Be exposed to simple image processing techniques. - Be familiar with image compression and segmentation techniques. - Learn to represent image in form of features.		
Unit I	**DIGITAL IMAGE FUNDAMENTALS:** Element of Digital Image Processing-Elements of Visual Perception -Psycho Visual Model Brightness-Contrast-Hue-Saturation, Machband Effect, Color Image Fundamentals-RBG-His Models, Image Sampling, Quantization, Dither, Matrix Theory Result, Block Matrices and Kronecker Products.		
Unit II	**IMAGE TRANSFORMS:** 2-D Orthogonal And Unitary Transforms,1-D And 2-D Discrete Fourier Transformation, Cosine, Sine, Walsh, Hadamard, Slant, Kurhunen-Loeve, Singular Value Decomposition Transforms.		
Unit III	**IMAGE ENHANCEMENT:** Point Operation-Contrast Stretching, Clipping and Thresholding Density Slicing, Histogram Equalization, Modification and Specification, Spatial Operation-Spatial Averaging, Low Pass, Highpass Band Pass Filtering, Direction Smoothing, Medium Filtering and Homomorphic Filtering		
Unit IV	**IMAGE RESTORATION:** Image Observation Model, Sources of Degradation, Inverse and Wiener Filtering, Geometric Mean Filter, Non Linear Filter, Smoothing Splines and Interpolation, Constrained Least Squares Restoration.		
Unit V	**IMAGE DATA COMPRESSION:** Image Data Rates, Pixel Coding, Need For Data Compression. Error Free Compression: Variable Length Coding, Bit Plane Coding, LZW Coding, Lossy Compression: Transform Coding, Wavelet Coding, Compression Standards: Binary Image Compression Standard, Still Image Compression Standards, Video Compression Standards. **Dynamic content:** Latest Techniques in Compression.		
Reference and Text Books:			
Jayaraman.S, Veerakumar.T and Esakkirajan.S, 2009,*Digital Image Processing,*1e McGraw Hill Education. Khalid sayood, 2018. *Introduction to Data Compression*,5th Edition published by Morgan Kaufmann , Rafael Gonzalez.C and Richard Woods E. 2014, *Digital Image Processing*, 3e, Pearson.			
Outcomes	- Discuss digital image fundamentals. - Apply image enhancement and restoration techniques. - Use image compression and segmentation Techniques and represent features of images.		

Name of the Course Teacher:**Dr. M. Vanitha**

Semester-V			
Course Code: 541502	**MOBILE COMMUNICATIONS**	**Credits:4**	**Hours:4**

Objectives	• To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture. • To have an exposure about wireless protocols, Bluetooth issues. • To Know the Network, Transport Functionalities of Mobile communication
Unit I	**Introduction:** Applications - A Simplified reference model. **Wireless transmission:** Frequencies for radio transmission - Signals – Antennas - Signal propagation - Multiplexing - Modulation - Spread spectrum - Cellular systems.
Unit II	**Telecommunications Systems: GSM:** Mobile services - System architecture - Radio interface – Protocols – Security. **UMTS:** UMTS system architecture - UMTS radio interface. **Satellite Systems:** Applications - Basic Types of Satellite Orbits - GEO - LEO - MEO - Routing - Localization – Handover.
Unit III	**Wireless LAN:** IEEE - System architecture - Protocol architecture. **Bluetooth:** User scenarios - Architecture - Radio layer - Baseband layer - Link manager protocol - L2CAP - Security – SDP - Profiles.
Unit IV	**Mobile Network Layer: Mobile IP** - Goals, assumptions and requirements - Entities and terminology - IP packet delivery - Agent discovery - Registration - Tunneling and encapsulation - Optimizations - Reverse tunneling - IPv6. **Mobile ad-hoc networks:** Routing - Destination sequence distance vector - Dynamic source routing - Overview ad-hoc routing protocols- **Wireless Application Protocol:** Architecture.
Unit V	**Android:** Android Components – Android Development Tools – Android Application Architecture – Installation – Android Virtual Devices–Emulator–Create and Run Android Virtual Device – Your First Android Project – Starting an Installed Application. **Dynamic content: 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 Text Books:

AsokeTalukder.K,Hasan Ahmed and RoopaYavagal.R, 2011, Second Edition,. *Mobile Computing,* McGraw Hill.

Jochen Schiller, 2008. *Mobile communications*, Pearson Education, Second Edition.

Lars Vogel, 2012, *Android Development Tutorial Based on Android 4.0*, tutorial.

Vijay Garg , 2007 *Wireless communication and Networking* ,First Edition ,Elsevier.

Wei–Meng Lee, 2012,*Beginning Android Application Development*, John Wileyand Sons Inc.

Outcomes:	• Know about different types of Wireless Communication Networks and their functionalities. • Understand the architectures, the challenges and the Solutions of Wireless Communication those are in use. • Realize the role of Wireless Protocols in shaping the future Internet. • Able to develop simple Mobile Application Using Android

Name of the Course Teacher:**Dr. P. Eswaran**

Semester-V			
Course Code:541503	**PYTHON PROGRAMMING**	**Credits:5**	**Hours:5**
Objectives	• To introduce object oriented programming using an easy-to-use language. • To use iterators and generators. • To test objects and handle changing requirements. • To be exposed to programming over the web.		
Unit I	Introduction to Python: Introduction-Python Overview-Comments-Identifiers-Reserved Keywords-Variables-Standard Data type-Operators-Statements and Expressions-String Operations-Boolean Expressions-Control Statements-Iteration Statements-Input from Keyboard.		
Unit II	Function, String, Lists: Introduction-Built-in Functions-User defined Functions-Python Recursive Function- Writing Python Scripting.		
Unit III	Strings: Introduction-String handling functions-String Formatting operator and functions-Lists: Value & Accessing Elements-Deleting elements from List-Built-in List Operators and methods		
Unit IV	Tuple, Files & Exceptions: Introduction-Creating Tuple-Accessing Tuple-Tuple Assignment - Tuple as Return Value-Basic Tuple Operations and Functions-Files: Text File- Directories- Exceptions: Exception with arguments-User-Defined Exceptions.		
Unit V	Classes & Objects: Introduction-class Definition-creating Objects-Objects as a Arguments-Object as Return Values-Built-in Class Attributes-Inheritance-Method Overriding-Data Encapsulation-Data Hiding.		

Reference and Text Books:

Allen Downey, Jeffrey Elkner, Chris Meyers , *How to think like a computer scientist : learning with Python* , Freely available online.2012

Balagurusamy, 2016, *"Introduction to Computing & Problem Solving Using Python"*, McGraw Hill Education.

Budd.T*Exploring Python*, TMH, 1st Edition, 2011.

Outcomes	• Discuss the concepts of object oriented programming. • Use generators and iterators. • Develop test cases and handle refactoring. • Use objects to program over the web. • Able to learn the various object oriented methodologies and choose the appropriate one for solving the problem • Understand the concept of analysis, design & testing to develop a document for the project

Name of the Course Teacher:**Dr. K. Mahesh**

ELECTIVE GROUP – I			
Course Code:541551	**OBJECT ORIENTED ANALYSIS AND DESIGN**	**Credits:4**	**Hours:4**
Objectives	• To demonstrate and apply basic object oriented techniques to create and modify object oriented analysis and design models. • To understand and apply testing techniques for object oriented software		
Unit I	**Object Oriented System Development:** Introduction – Object basics - The Object Model : Evolution – Elements - Classes and Objects: Object nature – Relationship among objects – Class nature – Relationships among classes – Building quality classes and objects – System Development Life Cycle.		
Unit II	**Object Oriented Methodologies:**Rumbaugh Object Modeling Technique – Booch – Jacobson – Patterns – Frame Works – The Unified Approach – UML – Static and Dynamic Model – UML diagrams.		
Unit III	**Object Oriented Analysis:** Identifying Use Cases – Use Case Model – Documentation – Classification: Identifying Classes – Noun Phrases Approach – Common Class Pattern Approach – Use Case Driven Approach – Identifying Object Relationship Attributes and Methods**.**		
Unit IV	**Object Oriented Design:** Introduction – Design Process – Design Axioms – Designing Classes – Visibility – Refining Attributes – Designing Methods - Access Layer Design – View Layer Design.		
Unit V	**Coding And Testing:** Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing. Managing Analysis And Design – Evaluation Testing – Impact of object oriented testing - Coding – Maintenance – Metrics – Client/Server Computing.		
Reference and Text Books: Ali Bahrami, 2008, *Object Oriented System Development*, Tata McGraw Hill Edition. Craig Larman, 2005 "*Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, pearson Education.* Grady Booch, Robert Maksimchuk.A et.al, 2009 *Object Oriented Analysis and Design with applications,* 3e, Pearson Education. Grady Booch, Robert Maksimchuk, Michael Engle, Jim Conallen, Kelli Houston, Young Bobbi, 2007, "*Object-Oriented Analysis and Design with Applications*", 3e, Addison-Wesley Professional. Rumbaugh / Blaha, "Object - Oriented Modeling and Design With UML", Pearson Education India, 2e, 2007.			
Outcomes:	• Able to learn the various object oriented methodologies and choose the appropriate one for solving the problem • Understand the concept of analysis, design & testing to develop a document for the project		

Name of the Course Teacher:**Dr. E. Elakkiya**

ELECTIVE GROUP-I			
Course Code 541552	**SOFTWARE PROJECT MANAGEMENT**	**Credits: 4**	**Hours: 4**
Objectives	• To know of how to do project planning for the software process. • To learn the cost estimation techniques during the analysis of the project. • To understand the quality concepts for ensuring the functionality of the software.		
Unit I	**Conventional Software Management:** The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation. Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.		
Unit II	**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process. Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.		
Unit III	**Model based software architectures:** A Management perspective and technical perspective. Work Flows of the process: Software process work flows, Iteration workflows. Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments		
Unit IV	**Iterative Process Planning:** work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment		
Unit V	**Iterative Process Planning:** work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment		
Reference and Text Books: Bob Hughes and Mike Cotterell, 2011, *Software Project Management*: Tata McGraw-Hill Edition. Chandramouli / Dutt, 2015 "*Software Project Management*", 1e, Pearson Education India. Gobalswamy Ramesh, 2003 "*Managing Global Software Projects*", Tata McGraw Hill Publishing Company. Walker Royce, 2012, *Software Project Management*, Pearson Education			
Outcomes:	• Understand the activities during the project scheduling of any software application. • Learn the risk management activities and the resource allocation for the projects. • Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing		

Name of the Course Teacher:**Mr. S. Balasubramanian**

ELECTIVE GROUP-I			
Course Code 541553	**SOFTWARE TESTING METHODLOGIES**	**Credits:4**	**Hours: 4**
Objectives	- To know the behavior of the testing techniques to detect the errors in the software - To understand standard principles to check the occurrence of defects and its removal. - To learn the functionality of automated testing tools - To understand the models of software reliability.		
Unit I	**Introduction:** Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow Graphs and Path Testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.		
Unit II	**Transaction Flow Testing:** Transaction flows, transaction flow testing techniques. Dataflow testing:-Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.		
Unit III	**Paths, Path Products and Regular Expressions:** Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications.		
Unit IV	**State, State Graphs and Transition Testing:** State graphs, good and bad state graphs, state testing, Testability tips. Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.		
Unit V	**Automation and Testing tools:** Need for automation – categorization of Testing Tools – Selection of Testing Tools – Costs Incurred in Testing Tools – Guidelines for Automated Testing – Overview of some commercial Testing Tools. Testing the Object-oriented software – Testing the web-based systems.		
Reference and Text Books: Boris Beizer, 2009, *Software Testing Techniques*, 2e, Intl Thomson Computer Pr (T) GlenfordMyers.J, Corey Sandler and Tom Badgett, 2011, 3e, *The Art of Software Testing*, Wiley. NareshChauhan, *Software Testing Principles and Practices*, Oxford University Press			
Outcomes	- Test the software by applying testing techniques to deliver a product free from bugs - Evaluate the web applications using bug tracking tools. - Investigate the scenario and the able to select the proper testing technique - Explore the test automation concepts and tools - Evaluate the estimation of cost, schedule based on standard metrics		

Name of the Course Teacher:**Dr. V. Palanisamy**

ELECTIVE GROUP – II			
Course Code541554	**NETWORK MANAGEMENT SYSTEMS**	**Credits:4**	**Hours:4**
Objectives	- To understand the principles of network management, different standards and protocols used in managing complex networks. - To understand the Automation of network management operations and making use of readily available network management systems.		
Unit I	**Data communication and network management overview:** Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Network, System and Service Management, Challenges of Information Technology Managers, Network Management: Goals, Organization and Functions, Network Management Architecture and Organization, Network Management System Platform, Current Status and future of Network Management		
Unit II	**SNMPV1 network management managed network:** The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The information Model. Network Management: SNMP Communication Model, Functional model .SNMP Management: SNMPv2: Major Changes in SNMPv2, SNMPv2 System architecture, SNMPv2 Structure of management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1		
Unit III	**SNMP management:** RMON: What is Remote Monitoring? RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, a Case Study of Internet Traffic Using RMONNETWORK MANAGEMENT TOOLS AND SYSTEMS: System Utilities for Management, Network Management System: Network Management, System and Application management, Enterprise Management and Telecommunications Management Systems		
Unit IV	**Telecommunications management (TMN) network:** Why TMN? Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, TMN Integrated View, TMN Implementation		
Unit V	**Web-based management:** NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network , Future Directions.		
Reference and Text Books: Mani Subramanian, 2010,*Network Management Principles and Practice*, 2e, Pearson Education. Mark Burges, 2008, *Principles of Network System Administration*, First Edition, Wiley Dream Tech. Morris, 2008, *Network management*, 1st Edition, Pearson Education.			
Outcomes	- Acquire the knowledge about various network management tools and the skill to use them in monitoring a network - Analyze the challenges faced by Network managers - Evaluate various commercial network management systems and open network management systems.		

Name of the Course Teacher:**Dr. P.Eswaran**

ELECTIVE GROUP-II			
Course Code : 541555	**NETWORK SECURITY**	**Credits:4**	**Hours: 4**
Objectives	• Acquire the knowledge about various network management tools and the skill to use them in monitoring a network • Analyze the challenges faced by Network managers • Evaluate various commercial network management systems and open network management systems.		
Unit I	Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks		
Unit II	Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, block cipher principles, data encryption standard (DES), location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.		
Unit III	Public key cryptography principles, public key cryptography algorithms,RSA algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service, other public key crypto systems		
Unit IV	Email privacy: Pretty Good Privacy (PGP) and S/MIME, Domain key identified mail (DKIM). IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and internet key exchange. Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), HTTPS506, secure shell(SSH)		
Unit V	Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems, password management, cyber-crime and computer crime, types of firewalls, firewalls basing.		
Reference and Text Books: BehrouzForouzan.A, 2010, *Cryptography & Network Security*, 2e, McGraw Hill Education. Michael Simpson.T, Kent Back man and James E. Corley, 2013, *Hands-On Ethical Hacking and Network Defense,2e, Cengage Learning.* William Stallings, 2007, *Network Security Essentials (Applications and Standards),* Pearson Education. William Stallings, 2013, *Cryptography and Network Security,(principles and practices*), 6e, Pearson Education.			
Outcomes:	• Apply cryptographic algorithms for encrypting and decryption for secure data transmission • Get the knowledge about the security services available for internet and web applications • Gain the knowledge of security models and published standards		

Name of the Course Teacher:**Dr. V. Palanisamy**

ELECTIVE GROUP-II			
Course Code: 541556	**WIRELESS NETWORKS**	**Credits:4**	**Hours:4**
Objectives	• To study about Wireless networks, protocol stack and standards. • To study about fundamentals of 3G Services, its protocols and applications. • To study about evolution of 4G Networks, its architecture 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	**MOBILENETWORK LAYER:** Introduction – Mobile IP: IP packet elivery, 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 NETWORK 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 Text Books: Anurag Kumar, Manjunath.D, 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 Simon Haykin , Michael Moher, David Koilpillai, 2013 ,*Modern Wireless Communications*, First Edition, Pearson Education. Vijay Garg , 2007, *Wireless Communications and networking*, First Edition, Elsevier			
Outcomes:	• Update on latest wireless technologies and trends in the communication field • Understand the transmission of voice and data through various networks		

Name of the Course Teacher:**Dr. P. Eswaran**

	ELECTIVE GROUP-III		
Course Code: 541558	**EMBEDDED SYSTEMS**	**Credits:4**	**Hours:4**
Objectives	• To provide in-depth knowledge about embedded systems, its software. • To understand the architecture of embedded processors, microcontrollers, and peripheral devices. • To appreciate the nuances of programming micro-controllers in assembly for embedded systems. • To explain an embedded software development tool.		
Unit I	**Introduction to Embedded Systems**: Overview of embedded systems, features, requirements and applications of embedded systems, recent trends in the embedded system design, common architectures for the ES design, embedded software design issues, interfacing and communication Links, introduction to development and testing tools		
Unit II	**Embedded System Architecture**: Basics of 8 – bit RISC microcontroller (PIC), block diagram, addressing modes, instruction set, timers, counters, stack operation, programming using PIC controller, basics of 32 – bit microprocessor (ARM), processor and memory organization, data operations, flow of control, pipelining in ARM, ARM bus (AMBA).		
Unit III	**Embedded Software:** Programming in embedded environment, Programming for microcontrollers such as Intel 8051 and PIC, overview of Java 2 micro edition (J2ME), concept of a MIDLET, applications of J2ME in mobile communication.		
Unit IV	**Applications of Embedded Systems**: Industrial and control applications, networking and telecom applications, DSP and multimedia applications, applications in the area of consumer appliances, concept of smart home.		
Unit V	**Embedded System Application Development:** Case Study of Washing Machine-Automotive Application- Smart card System Application		
Reference and Text Books: Andrew Sloss.N , 2007, *Dominic Symes, Chris Wright, ARM System Developer's Guide – Designing and Optimizing System Software*, Elsevier Publications. Daniel Lewis.W, 2001, *Fundamentals of Embedded Software where C and assembly meet*, Pearson Education. John Peatman.B, 2003*, Design with PIC Microcontrollers*, Pearson Education. Michael Juntao Yuan, Enterprise, 2003, J2ME – *Developing Mobile Java Applications*, Pearson Education,. Prasad.K.V.K.K, 2003, Embedded/Real Time Systems: Concepts, *Design and Programming*, Dreamtech Press, New Delhi, India. Robert B. Reese, 2005, *Microprocessors: From assembly language to C using PIC18Fxx2*, Shroff Publishers and Distributors Pvt Ltd. Silberschatz, P.B.Galvin and G. Gagne, 2001 , *Operating System Concepts*, 6th ed, John Wiley & Sons, Inc., Wayne Wolf, 2008, *Computers as Components: Principles of Embedded Computing System Design*, Second edition, Elsevier Publication.			
Outcomes	• Introduce the student with software concepts used in embedded systems. • This Course provides sufficient Knowledge to understand the embedded systems design, embedded programming and their application. • This purpose of this course is to impact knowledge on embedded system.		

Name of the Course Teacher:**Dr. K. Mahesh**

ELECTIVE GROUP-III			
CourseCode:541559	INTERNET OF THINGS (IoT)	Credits:4	Hours:4
Objectives	• Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved. • Understand IoT sensors and technological challenges faced by IoTdevices, with a focus on wireless, energy, power, RF and sensing modules. • Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi. • To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service). • Understand the various types Trust models and Cloud Security. • To learn the concepts of data analytics.		
Unit I	**Fundamentals of IOT** Introduction-Characteristics - Physical design - Protocols-Logical design - Enabling technologies - IoT levels-Domain specific IoTs - IoTvs M2M		
Unit II	**IOT Design Methodology** IoT systems management - IoT design methodology-Specifications - Integration and Application Development		
Unit III	**IOT Components** Sensors and activators - Communication modules - Zigbee-RFID-Wi-Fi-Power sources.		
Unit IV	**Building IOT with Hardware Platforms** Platform - Arduino/Intel Galileo/Raspberry Pi- Physical device - Interfaces - Programming - APIs/Packages - Web services.		
Unit V	**Case Studies** Various Real time applications of IoT-Connecting IoT to cloud-Cloud storage for IoT-Data Analytics for IoT- Software & Management Tools forIoT.		
Reference and Text Books: ArshdeepBahga, Vijay Madisetti, 2015, *Internet of Things-A hands-on approach*, Universities Press,. Manoel Carlos Ramon, 2014, *Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers*, A press. Marco Schwartz, 2014,*Internet of Things with the ArduinoYun*, Packt Publishing.			
Outcome:	• The purpose of this course is to impart knowledge on Internet of Things (IoT), which relates to the study of sensors, actuators, and controllers, among other Things, IoT applications and examples overview (building automation, transportation, healthcare, industry, etc.) with a focus on wearable electronics. • To learn the security principles and methodologies for Internet of Things. • The purpose of this course is to impart knowledge on IoT Architecture and various protocols, study their implementations. • This course provides a way to understand the concepts and the basics of data analytics and their role in Internet of things.		

Name of the Course Teacher:**Dr. A. Nagarajan**

	ELECTIVE GROUP IV		
CourseCode: 541560	**RESOURCEMANAGEMENT TECHNIQUES**	**Credits:4**	**Hours:4**
Objectives	- To provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications. - To understand , develop and solve mathematical model of linear programming problems, Transport and assignment problems - To Understand network modeling for planning and scheduling the project activities		
Unit I	Linear Programming: Formulations and Graphical Solutions to Linear Programming Problems – Simplex method – Degeneracy – Unbounded – Infeasible Solution – Method of Penalty – Two Phase Method.		
Unit II	Duality – Primal and Dual computations – Dual Simplex Method – Transportation Problem – Assignment Problem.		
Unit III	Integer Programming: Pure and Mixed Integer Programming Problems – Gomary Cutting – Plane Method – Fractional and Mixed Algorithms – Branch and Bound Techniques		
Unit IV	Project Scheduling - PERT-CPM: Phase of Project Scheduling – Arrow Diagram – CPM – Probability and Cost Considerations in Project Scheduling – Crashing of Networks		
Unit V	Queuing Theory: Queuing System – Characteristics of Queuing System – Classification of Queues – M/M/1 and M/M/C queuing Models. Inventory Management: Inventory control – ABC Analysis – Economic Lot Size Problems – EOQ with uniform Demand and Shortages – Limitations of Inventories – Buffer Stock – Determination of Buffer Stocks		
Reference and Text Books:			
Hamdy A Taha, 1987,*Operations Research: An Introduction*, Fifth edition, Macmillan. Natarajan.A.M, Balasubramani.P and Tamilarasi.A, 2005, *Operations Research*, Pearson Education. SankaraIyer.P, 2008, *Operations Research*, Tata MCGraw-Hill. Sharma.J.K, 2007, *operations Research Theory and Applications*, 3e, Macmillan India Ltd. Swarup.K.P, Gupta.P.K and Mohan.M, 1994, *Operations Research*, Sultan Chand.			
Outcomes	- Understand and apply linear, integer programming to solve operational problem with constraints - Apply transportation and assignment models to find optimal solution in warehousing - To prepare project scheduling using PERT and CPM		

Name of the Course Teacher:**Dr. B. Yasodara**

ELECTIVE GROUP-IV			
CourseCode :541561	**SOFT COMPUTING**	**Credits:4**	**Hours:4**
Objectives	• To learn the key aspects of Soft computing • To know about the components and building block hypothesis of Genetic algorithm. • To study the fuzzy logic components		
Unit I	Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics – Applications – Artificial Neural Network (ANN): Fundamental Concept – Application Scope – Basic Terminologies – Neural Network Architecture – Learning Methods – Fundamental Models of ANN: McCulloch-Pitts Model –Hebb Network – Linear Separability.		
Unit II	Supervised Learning Networks: Perceptron Network – Adaline and Madaline Networks –Back Propagation Network – Radial Basis Function Network – Associative Memory Networks – Bidirectional Associative Memory – Hopfield Network. Unsupervised Learning Networks: Kohonen Self-Organizing Feature Maps – Counter Propagation Networks – ART Network.		
Unit III	Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set – Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Tolerance and Equivalence Relation – Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.		
Unit IV	Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Fuzzy Rules – Fuzzy Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making –Fuzzy Logic Control Systems.		
Unit V	Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm – Elements of GA – Encoding – Fitness Function – Genetic Operators: Selection –Cross Over – Inversion and Deletion – Mutation – Simple and General GA – The Schema Theorem –Classification of Genetic Algorithm – Genetic Programming – Applications of GA.		
Reference and Text Books: Samir Roy, 2013,*Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms*, Pearson education, Sivanandam.S.N, Deepa.S.N, 2007*, Principles of Soft Computing*, Wiley India.			
Outcomes:	Write Genetic Algorithm to solve the optimization problem • Understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.		

Name of the Course Teacher:**Dr. E. Elakkiya**

ELECTIVE GROUP-IV				
CourseCode :541562	**CLOUD COMPUTING**		**Credits:4**	**Hours:4**

Objectives	To understand the concept of cloud computing. • To have knowledge on the various cloud services. • To be familiar with the cloud environments. • To provide in-depth knowledge about cloud information security.
Unit I	Cloud Computing – Introduction – History – Working of cloud computing – Cloud computing today – Pros and cons of Cloud Computing – Benefits of cloud computing – Non users of Cloud compute – Developing cloud services – Pros and Cons of Cloud service Development – Types of Cloud Service Development – Discovering Cloud Services development services and tools.
Unit II	Cloud computing for everyone: Centralizing Email Communications – Collaborating of Grocery lists – Collaborating on To-Do lists – Collaborating on Household budgets – Collaborating on Contact lists – Communicating across the community – Collaborating on Schedules – Collaborating on group projects and events – Cloud computing for the corporation
Unit III	Using cloud services : Exploring online calendar applications – Exploring online scheduling applications – Exploring online planning and task management – Collaboration on event management – Collaboration on Contact Management – Collaboration on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing files and other online content
Unit IV	Cloud Computing Environments – How it all began – A Classification of Cloud Implementations – Amazon Web Services – IaaS – VmwarevCloud – Iaas – Google AppEngine – PaaS – Windows Azure Platform – PaaS – Salesforce.com – SaaS / PaaS – Microsoft Office Live – SaaS – Google Apps – SaaS – A Comparison of Cloud Computing Platforms.
Unit V	Cloud information security Objective – Cloud security services – Relevant Cloud Security design principles – Secure Cloud software requirements – Secure Cloud software testing – Cloud computing and business continuity planning / Disaster recovery. Cloud computing security architecture: Architectural consideration – Identity management and access control – Autonomic Security.

Reference and Text Books:

AnthonyVelte.T, Toby Velte.J, Robert Elsenpeter, 2010, *Cloud Computing – A Practical Approach*, Tata McGraw Hill,

Michael Miller, 2018*, Cloud computing – Web based applications that change the way you work and collaborate online*, Pearson Education Inc.

Ronald Krutz.L and Russell Dean Vines, 2010, *Cloud Security – A Comprehensive guide to secure cloud computing* , Wiley India Pvt Ltd.

Outcomes	**Upon completion of the course, the students will be able to:** • Articulate the main concepts, strengths and limitations of cloud computing. • Learn the key and enabling technologies that help in the development of cloud. • Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models. • Explain the core issues of cloud computing such as resource management and security.

Name of the Course Teacher:**Mr. S. Balasubramaniam**

ELECTIVE GROUP-V				
Course Code :541563		**E-COMMERCE**	**Credits:4**	**Hours:4**
Objectives	- To understand how electronic commerce is affecting business enterprises, governments, consumers and people in general. - To understand the development of websites using relevant software tools.			
Unit I	Introduction to E-Commerce: The scope of E-Commerce - Definition – Internet commerce – Electronic Markets – Electronic Data Exchange. Business Strategy in an Electronic Age: The value chain – supply chains – Porter's value chain Model – Inter organizational value chains – Competitive Advantage using e-commerce.			
Unit II	Strategic implications of IT - Business capability - Strategy formulation and Implementation Planning - e-commerce implementation - e-commerce evaluation. Case Studies: Airline Booking Systems – Web Booking Systems – Competitive Outcome.			
Unit III	Business to Business Electronic Commerce: Inter-organizational Transactions – Electronic Markets – Advantages and Disadvantages of Electronic Markets and its future. Electronic Data Interchange (EDI): Definitions, Examples – EDI Technology – EDI Communications – Implementation – EDI Agreements – Security Purchasing On-line.			
Unit IV	Business to Consumer Electronic Commerce: The e-shop – e-commerce technologies – consumer e-commerce advantages and disadvantages – Internet Concepts – TCP/IP – Uses of Internet – Internet Age Systems			
Unit V	Digital payment requirements – Digital token-based e-payment system – classification of new payment system – Electronic cash(e-cash) – Risk and e-payment system – Designing e-payment Systems – Digital Signature – Online Stock Trading.			
Reference and Text Books:				
David Whitley, 2000,*E-Commerce: Strategy*, *Technologies and Applications* –Tata McGraw Hill Publishing Company.				
Deborah Bayles.L*, E-Commerce Logistics and Fulfillment*, Pearson Education Asia, Addison Wesley Longman (Singapore) Pvt. Ltd.				
Joseph.P.T, 2015*, S.J, E-Commerce: An Indian Perspective – PHI Learning*, Private Limited.				
Pete Loshin, John vacea, 2006, *Electronic Commerce*, 4E, Firewall media.				
Outcomes	After the completion of this course, the student will able to - Acquire the knowledge about the components and roles of the Electronic Commerce Environment - Identify and reach customers on the Web. - Describe the qualities of an effective Web business presence. - Describe E-Commerce payment systems.			

Name of the Course Teacher:**Dr. M. Vanitha**

ELECTIVE GROUP-V			
CourseCode:541564	WAP and WML	Credits:4	Hours:4
Objectives	• To enable the students to learn the basic concepts of Wireless Application Protocol and Wireless Mark-up languages • To acquire knowledge about Database connectivity		
Unit I	**INTRODUCING WAP:** What is WAP, Importance & Benefits of WAP, History of WAP, WAP Architecture, WAP Services, Why WAP, and Future of WAP. **BASICS OF A GOOD WAP APPLICATION:**WAP Micro browsers, Generic WML Interface, Application design process, common design mistakes		
Unit II	**THE USER INTERFACE:** User interface basics, Low bandwidth, Small Screen size, Text Entry, Using the Cache, Types of WML cards, The Back button. **WAP DEVELOPMENT TOOLS & SOFTWARE:** Editors& emulators, Software Developer Kits and Integrated Development Environments, Converting Images, Specification of Well defined WBMP types.		
Unit III	**WORKING WITH WML:** WML Basics, WAP & the Web, writing WML code, The document prologue, the Deck header, The First Card, the Second Card, The Deck Footer, Using Multiple decks, Graphics, Creating Links, Templates.		
Unit IV	**INTERACTIVITY:** FORMS & USER INPUT:- The Options Menu, Selection on the Nokia, Selection on Phone.com, Option Groups, Templates, the Do Element, Events, Orienter backward, Orienter forward, Onpick, Ontimer, Variables, The Input Tag, Data Formatting. **ADDING FUNCTIONALITY WITH WML Script :**What is WML Script, The rules of WML Script, Variables, Operators, Control Constructs, Reserve Words, Functions, The Standard Libraries, Arrays, Pragmas, General coding principles.		
Unit V	**DATABASE DRIVEN WAP:** Active Server Pages, ASP & WAP, The ASP Object Model, ActiveX Objects, Physically Connecting To Database, Querying The Database, Using The Returned Data, Tidying Up. **DYNAMIC CONTENT:** 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. 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.		
Reference and Text Books:			
Charles Arehant, Nirmal Chidambaram, ShashiKiranGuruprasad, Alex Homer, Ric Howell, Stephen Kasipillai, Rob Machin, Tom Mvers, Alexander Nakhimovski, Luca Passan, Chris Pedles, Richard Taylor, Marco Toschi , 2002, *Professional WAP*, Wrox Publications ,. 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. Ltd. Dylan Bromby, Ronan Mandel, Amy O'Leary, Robert Juncker.M, Paul Fonte, Keith Lauver.D, 2000,*WAP Development with WML and WML Script*, Ben Forta Publisher: Sams , Foo, Lee, Watson, Wugofski, 2001, *Beginning WAP, WML and WMLScript*, WROX Press. SandeepSinghal, Thomas Bridgman, LalithaSuryanarayana, Daniel Mauney, JariAlvinen, David Bevis,Jim Chan, Stefan Hild, 2003 , *The Wireless Application Protocol*, Pearson Education.			
Outcomes	On successful completion of the course the students should have • Understood WAP Concepts • Understood the WML		

Name of the Course Teacher:**Dr. A. Nagarajan**

ELECTIVE GROUP-V				
Course Code : 541565		**BIG DATA ANALYTICS**	**Credits:4**	**Hours:4**
Objectives	• To know the fundamental concepts of big data and analytics.			
	• To explore tools and practices for working with big data			
	• To learn about stream computing.			
	• To know about the research that requires the integration of large amounts of data.			
Unit I	Introduction to Big Data Analytics – Data Analytics – Analytics Terminology –Types of Analytics – Analytics Life Cycle - Data Store – Getting Started with R – Data Exploration – Data Preparation			
Unit II	Introduction to machine learning –Dimensionality reduction –Hardware Acceleration for Machine Learning and Big Data Analytics–Social Network Analytics. Descriptive analytics.			
Unit III	Market Basket Analysis– Kernel Density Estimation– Regression– Relational Logistics Regression –Relational Neighbor Classifiers –Bigraphs – Collective Inferencing.			
Unit IV	**Common predictive Modeling Techniques:** RFM – Regression – Generalised Linear Models – Neural Network – Decision and Regression trees – Support vector Machines – Bayesian Methods Network Classification – Ensemble Methods.			
Unit V	**Segmentation and Hadoop–** Cluster Analysis – Distance Measures – Evaluating Clustering – Number of Clusters – K-means Algorithm – Hierarchical Clustering – Introduction to Neural Networks – Support Vector Machines - K Nearest Neighbor classification - Ensemble learning.Hadoop concepts - Hadoop distributed file system (HDFS) basics.			
Reference and Text Books:				
Bart Baesens, 2014, *Analytics in a Big Data World*, 1e, Wiley.				
Douglas Eadline, Addision Wesley, 2016, *Hadoop 2 Quick-Start Guide*.				
Jared Dean,Wiley, 2014, *Big Data, Data Mining, Machine Learning*, 1e				
Lakshmi Prasad.Y, 2016, *Big Data Analytics*, 1st Edition, Notion Press.				
Outcomes:	**Upon completion of the course, the students will be able to:**			
	• Work with big data tools and its analysis techniques			
	• Design efficient algorithms for mining the data from large volumes			
	• Design an efficient recommendation system			
	• Design the tools for visualization.			

Name of the Course Teacher:**Mrs. G.Shanthi**

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ELECTIVE GROUP- VI			
Course Code :541566	**C# AND ASP .NET**	**Credits:4**	**Hours:4**
Objectives	- This course presents the introduction to ASP.NET, functions, monitoring mouse activity, overview of .NET, .NET framework. - To enable the students to learn the basic functions, principles and concepts of Visual C# programming		
Unit I	Overview of C# - C# and .NET – Similarities & differences from JAVA- Structure of C# program – Language Fundamentals: Type system – Operators – Garbage Collection, Jagged Array Collection (Array list, Hash table), Indexer and property, boxing and unboxing – OOP with C# : Encapsulation Services – Inheritance and Polymorphic Supports – flow controls-classes and construction techniques – interfaces – Serialization – Delegates and events – Reflection.		
Unit II	Overview of ASP .NET frame work – understanding ASP .NET Controls – Applications – Web servers – installation of IIS – Web forms – web form controls- server controls – client controls – Web forms & HTML – Adding controls to a web form – Buttons – Text Box – Labels – Checkbox – Radio buttons – List box – etc.		
Unit III	Form Validation: Client side validation – server side validation- Validation Controls: Required Field Comparison Range – Calendar control – Ad rotator Control – Internet Explorer Control – State management-view state – Session state – Application state.		
Unit IV	ADO.Net & Object Oriented Concepts (Using C#) Basic window control– Architecture of ADO.NET – Connected and Disconnected Database – Create connection using ADO.NET Object model – Connection class- Command Class – Data Adapter Class- Dataset Class – Display data on data bound Controls and Data Grid – Database Accessing on web applications: Data Binding concept with web – creating data grid – Binding standard web server controls – Display data on web form using Data bound controls.		
Unit V	Writing datasets to XML – Reading datasets with XML – Web services: Introduction – remote method call suing XML – SOAP- web service description language- building & consuming a web service – Web Application deployment Dynamic Content: New features of advanced version of C# and .net framework.		
Reference and Text Books:			
Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, 2010, *Professional C# 4 and .NET 4*, Wrox Publications. Jeffery McManus.P, Chris Kinsman, 2002, *C# developers guide to ASP.NET, XML and ADO.NET*, Addision Wesley. JosephAlbahari, Ben Albahari, 2017, *C# 7.0 in a Nutshell*, 7th edition, O'Reilly. Russell Jones.A, *Mastering ASP.NET with C#*, Wiley.			
Outcomes:	On successful completion of the course the students should have: - Understood ASP.Net programming - Understood the C# programming techniques		

Name of the Course Teacher:**Dr. M. Vanitha**

ELECTIVE GROUP-VI			
CourseCode :541567	**MIDDLEWARE TECHNOLOGY**	**Credits:4**	**Hours:4**
Objectives	• The main objective of this course is to get on awareness of a the various technologies which can help in the implementation of the various live project • This course provides details about the modern component platforms. Students get the chance to gain in-depth knowledge popular middleware platforms		
Unit I	Client / Server Concepts:Client – Server – File Server – Database server – Group server – Object server –Web server – Middleware – General Middleware – Service specific middleware – Client / Server Building blocks – RPC – Messaging – Peer – to – Peer.		
Unit II	EJB Architecture: EJB – EJB Architecture – Overview of EJB software architecture – View of EJB – Conversation – Building and Deploying EJBs – Roles in EJB.		
Unit III	EJB Applications: EJB Session Beans – EJB entity beans – EJB clients – EJB Deployment – Building an application with EJB.		
Unit IV	CORBA – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB – Building an application with CORBA.		
Unit V	COM – Data types – Interfaces – Proxy and Stub – Marshalling – Implementing Server / Client – Interface Pointers – Object Creation – Invocation – Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture – Marshalling–Remoting.		

Reference and Text Books:

Ian Griffiths, Matthew Adams, Jesse Liberty, 2010, *Programming C# 4.0*, 6e, O'Reilly Media.

Jeremy Rosenberger, 2000, *Teach yourself CORBA in 14 days*, Tec media,.

Mowbray, 2002, *Inside CORBA*, Pearson Education.

Pitchard. , 2008, Com *and Corba Side By Side*, Pearson Education India.

Robert Orfali, Dan Harkey, Jeri Edwards, 2007, *Client/Server Survival Guide*, 3e, Wiley-India.

Tom Valesky, 2002, *Enterprise Java Beans*, Pearson Education.

Outcomes	Upon completion of the subject, students will be able to: • Understand the basic structure of distributed systems; • Understand the motivation of using middleware; • Learn to make judgment in choosing a suitable middleware for application problems • Understand the basic concepts of Web Services and EJB.

Name of the Course Teacher:**Mr. S. Balasubramanian**

ELECTIVE GROUP-VI			
Course Code :541568	**R PROGRAMMING**	Credits:4	Hours:4
Objectives	Familiar with the R language • The ability to perform basic functions with R • Framework for applying R to their own domain-specific problems • Understand basic concepts such as data type and index and use them in their work. • Conceptualize and create loops to solve different types of problems		
Unit I	**Overview of R**: What is R?, What is S?, The S Philosophy, Basic Features of R, Design of the R System, Limitations of R, R Resources - R Nuts and Bolts : Entering Input, Evaluation, R Objects, Numbers, Attributes, Creating Vectors, Mixing Objects, Explicit Coercion, Matrices, Lists, Factors, Missing Values, Data Frames, Names - Getting Data In and Out of R : Reading and Writing Data, reading Data Files with read. table(), Reading in Larger Datasets with read. table, Calculating Memory Requirements for R Objects - Using Textual and Binary Formats for Storing Data : Using dput() and dump(), Binary Formats		
Unit II	**Interfaces to the Outside World :** File Connections, Reading Lines of a Text File, Reading From a URL Connection - Dates and Times : Dates in R, Times in R, Operations on Dates and Times - Control Structures : if-else, for Loops, Nested for loops, while Loops, repeat Loops, next, break		
Unit III	**Functions :** Functions in R, Your First Function, Argument Matching, Lazy Evaluation, The ... Argument, Arguments Coming After the ... Argument,Scoping Rules of R: A Diversion on Binding Values to Symbol, Scoping Rules, Lexical Scoping: Why Does It Matter?, Lexical vs. Dynamic Scoping, Application: Optimization, Plotting the Likelihood - Coding Standards for R		
Unit IV	**Loop Functions:** Looping on the Command Line, lapply(), sapply(), split(), Splitting a Data Frame, tapply, apply(), Col/Row Sums and Means, Other Ways to Apply, mapply(), Vectorizing a Function – Debugging : Debugging tools in R, Using traceback(), Using debug(), Using recover().		
Unit V	**Profiling R Code :** Using system.time(), Timing Longer Expressions, The R profiler, Using summaryRprof(), Simulation : Generating random numbers, setting the random number seed, Simulating a Linear model, Random Sampling		
Garrett Grolemund, 2014,*Handbook of programming with R*, Kindle Edition.			
Jared Lander.R, *R for Everyone: Advanced Analytics and Graphics*, 1st edition, Addison-Wesley Professional.			
Nina Zumel& John Mount, 2013,*Practical Data Science with R, Manning Publishing*, 1st Edition.			
Norman Matloff, 2011, *The Art of R programming*, Kindle Edition.			
Roger D.Peng, 2015, *R Programming for Data Science*, Lean Publishing.			
Outcomes	• List motivation for learning a programming language. • Feel more familiar with the R interface and language.		

Name of the Course Teacher:**Dr. P. Eswaran**

Semester – II			
Course Code	**OBJECT ORIENTED PROGRAMMING AND C++ (NME-I)**	**Credits:2**	**Hours:3**
Objectives	- To understand the concept of data abstraction and encapsulation, inheritance and virtual functions implement dynamic binding with polymorphism. - To learn how to design and implement generic classes with C++ templates. - To learn how to use exception handling in C++ programs.		
Unit I	**Introduction**: Differences Between C And C++, The Object Oriented Technology , Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of OOP Structure of A C++ Program, Header Files And Libraries **Input and Output C++** : Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data, Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators. Basic concept in C++ programming: Operators, control structures, functions, overloading, and recursion Tokens in C++, Variable Declaration and Initialization, Data Types, Operators in C and C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision of Decision Statements, Control Loop Statements.		
Unit II	Functions in C++ : Introduction, Structure Of Function, Passing Arguments, Lvalues And Rvalues, Return By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles Of Function Overloading, Recursion. Classes and Objects: Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member function, memory allocation for objects, array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function. Object Initialization: Introduction - constructors, default constructor, parameterized constructors and multiple constructors in a class, dynamic initialization through constructors, copy constructor, dynamic constructor and destructor. Dynamic Objects: Introduction, pointers to objects, array of pointers to objects, this pointer.		
Unit III	Inheritance: Derived Class – Virtual Functions –Polymorphism - Abstract Base Class – Types of Inheritance.		
Unit IV	Introduction, File Stream Classes, File Opening Modes, File Pointers And Manipulators, Manipulators With Arguments, Sequential Access Files, Binary And ASCII Filesrandom Access Operation, **Programming with Templates**: Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates, Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates And Inheritance,		

	Container Classes , Types Of Containers, Container Adaptors, Iterators.
Unit V	Introduction – Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors, handling uncaught exceptions, exceptions in operator overloaded functions, exception in inheritance tree, exceptions in class templates, memory allocation failure exception.

Reference and Text Books:

Ashok Kamthane.N, 2013,*Programming In C++*, 2nd Edition, Pearson education,

BjarneStroustrup, 2013,"*The C++ Programming Language*", Fourth Edition, Addison Wesley.

Balagurusamy.E, 2017,*Object Oriented Programming with C++* , 7th Edition, Tata McGraw Hill
Publishing Co.

Rajaram.R, 2013.*Object Oriented Programming in C++,* Fifth Edition, New Age International
Publishers, New Delhi.

Robe Lafore,2012,*Object Oriented Programming in C++,* Fourth Edition, Galgotia Publications Pvt.
Ltd., New Delhi

SouravSahay, 2012,*Object Oriented Programming with C++,* 2nd edition, OXFORD,

Outcomes	• Able to understand and design the solution to a problem using object-oriented programming concepts. • Understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Name of the Course Teacher:**Dr. A. Nagarajan**

Semester-III				
Course Code: 541302	**JAVA PROGRAMMING** **(NME-II)**		**Credits: 2**	**Hours:** **3**
Objectives	• To provide an overview of working principles of web related functionalities • To understand and apply the fundamentals core java, packages, database connectivity for computing			
Unit I	Fundamentals of Object-Oriented Programming: - Basic concepts of OOP – Benefits – Applications Java Evolution: Features – how java differs from C and C++ - java and internet- java support system – java environment - Overview of Java Language – constants variables and data types- Operators and Expressions - Decision Making and Branching - Looping			
Unit II	Classes, Objects and Methods: - Defining a class –fields –methods –creating objects – accessing class members – constructors – methods overloading –static members – nesting of methods – Inheritance –overriding methods –final variables-classes – methods- Arrays, Strings and Vectors :One dimensional Arrays –creating of array – Two dimensional arrays- strings –vectors –Wrapper classes – Enumerated Types - Packages: Defining interface –Extending interfaces – Implementing Interfaces.			
Unit III	JDBC Overview - Connection Class –Meta Data Function –SQL Exception– SQLwarning - Statement –Result Set - Other JDBC Classes.			
Unit IV	Inet Address - TCP/ IP client sockets - TCP/ IP server sockets - URL – URL Connection - Datagrams - Client/ Server application using RMI.			
Unit V	JApplet - Button - Combo - Trees - Tables – Panes. Introduction to AWT - Working with windows, Graphics, Text using AWT Controls and Layout managers.			
Reference and Text Books: Balagurusamy.E, 2011, 5e, Tata McGraw-Hill. Herbert Schildt, 2017, *"Java Programming with Java -The Complete Reference*", 9E, McGraw-Hill. Krishnamoorthy.R and Prabhu.S, 2004, *Internet and Java Programming*, New Age International Publishers Wigglesworth and Wandra, 2011, "*Java Programming Advance Topics*", 3e, Cengage.				
Outcomes	• Able to understand the internet standards and recent web Technologies • Able to implement, compile, test and run Java program, • Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API			

Name of the Course Teacher:**Dr. M. Vanitha**

Name	: **Dr. ArokiaswamiAlphones**
Designation	: Associate Professor in School of Electrical & Electronic Engineering,
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Email	: ealphones@ntu.edu.sg

Educational qualification:

- Ph.D., Kyoto Institute of Technology (Japan) in 1992
- M.Tech., Indian Institute of Technology Kharagpur in 1984
- B.Tech., Madras Institute of Technology in 1982

Professional experience:

- Associate Professor at the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore
- Research Experience: 30 years

Area of Research:

- Electro-magnetic analysis on planar RF circuits and integrated optics, met materials, Periodic structures, microwave photonics, and wireless power transfer using met materials.

Additional Responsibilities:

- JSPS visiting fellow from 1996-97 at Japan.
- Senior Member of Technical Staff, involved in the research on optically controlled passive/active devices from 1997-2001 at National University of Singapore
- Senior Member of IEEE
- He is in the editorial review board of IEEE Microwave Theory and Techniques and Microwave and Wireless Components Letters.

Recent publications:

- H. Yang, C. Chen, W. Zhong, A. Alphones, S. Zhang, and P. Du. (2019). Demonstration of a quasi-gapless integrated visible light communication and positioning system. *IEEE Photonics Technology Letters, 30*(23).
- Y Helin, C Chen, WD Zhong and AAlphones. (2018). Joint Precoder and Equalizer Design for Multi-User Multi-Cell MIMO VLC Systems. *IEEE Transactions on Vehicular Technology , 67*, 11354-11364.
- YS Rao, WJ Lai, AAlphones and P Shum. (2018). Mid-IR Superconiniuum Generation in a Single Mode ZBLAN fiber by Erbium-doped Fiber Laser. *Optical Engineering, 57*(11).
- P. Du, S. Zhang, C. Chen, A. Alphones, and W. Zhong. (2018). Demonstration of a Low-complexity Indoor Visible Light Positioning System Using an Enhanced TDOA Scheme. *IEEE Photonics Journal, 10*(4).
- J P K Sampath, AAlphones and DM Vilathgamuwa. (2015). Tunable Metamaterials for Optimization of Wireless Power Transfer Systems. *IEEE Antennas and Propagation- USNC Symposium.*

Total Publications: 300

Name	: **Dr. B. Ramadoss**
Designation	: Professor in Computer Applications
Address	: National Institute of Technology , Trichirappalli
Phone	: 0431-2503735
Email	: ramadoss.b5@gmail.com

Educational qualifications:

- M. Tech., Computer Science and Engineering (Indian Institute of Technology - IIT)
- Ph.D., Applied Mathematics (Indian Institute of Technology - IIT)

  cience and Engineering in 1995 from the Indian Institute of Technology, Delhi

Professional experience:

- Professor-Computer Applications at National Institute of Technology, Tiruchirapalli.
- Teaching Experience : 33 Years
- Research Experience: 23 Years

Area of Research:

- Testing Methodologies, Security and Privacy in Big Data and Cloud, Software Metrics, Data Warehouse – EAI, Data Mining, WBL, and XML

Additional Responsibilities:

- Member of IEEE
- Life Member (LM) of ISTE, New Delhi
- Life Member (LM), Computer Society of India.

Awards:

- Best Teacher Award in the Dept. of Computer Applications, NIT, Trichy
- Awarded medal for Engineering Technology and cash prize for the research paper published in the irrigation and power journal.

Recent publications:

- Secure Data Communication using File Hierarchy Attribute Based Encryption in Wireless Body Area Networks, **Journal of Communications Software and Systems**, March 2018, VOL. 14, pp 75-81, impact factor 0.58.
- An Efficient Tate Pairing Algorithm for a Decentralized Key-Policy Attribute Based Encryption Scheme in Cloud Environments,**Cryptography**, July 2018, Volume 2, Issue 3 (14), pp 1-1, impact factor 1.021.
- Fusion of Medical Images Using Mutual Information And Intensity Based Image Registration Schemes, **ARPN Journal of Engineering and Applied Sciences**, May 2015, Vol. 10, NO. 8, ISSN 1819-6608, impact factor 0.765.
- Framework for Mission-Based Evaluation of Integrated Avionics Systems of Unmanned Air Vehicles using Functional Mutation Operators for Timeliness, **International Journal of Software Engineering and Its Applications**, 2015, Vol. 9, No. 7, pp. 43-52, ISSN: 1738-9984,impact factor 0.54.
- Mitigating false alarms using accumulator rule and dynamic sliding window in wireless body area, **CSI Transactions on ICT, Springer**, June 2018, Volume 6, Issue 2, pp 203–208

Total Citation: 252**h- index**: 7**i10- index** : 7

Name	**:Dr. LaveenVikramSundararaj**
Designation	**: Engineering Manager**
Addresss	**: C 12/3 NIT Quarters, NIT Warangal**
	Warangal – 506 004
Phone	**: 93422 41464**
Email	**: laveenvikram@gmail.com**

Educational qualification:

- **EGMP .,** Indian Institute of Management, Bangalore (IIMB) in 2015.
- **Ph.D.,** Computer Science & Engineering from Alagappa University in 2013.
- **M.Phil**., Computer Science and Engineering from Alagappa University in 2007.
- **M.Sc**., Information technology from Alagappa University in 2004;
- **B.E.,** Electronics and Communication Engineering from Bharathiar University in 2001.

Professional experience:

- **Engineering Manager** – Displays & Graphics (Government Systems – Displays Applications), **Rockwell Collins India**, Hyderabad. **(Sep 2017 Onwards)**
- Various positions with **Honeywell Technology Solutions**: Sep 2015 – Aug 2017, Sr Systems Engineer; Jun 2011 – Aug 2015, Project Leader; Nov 2008 – May 2011, Technology Specialist; Jun 2007 – Oct 2008, Tech Lead; Jun 2005 – May 2007, Pr. Engineer; Jun 2003 – May 2005, Sr. Software Engineer; Jun 2001 – May 2003, Software Engineer. **Patent:** Unmanned Vehicle Proximity Warning System – USPTO Application No: 15/247,555 filed on Aug 25, 2016.
- Research Experience: 17+ years

Area of Research:

- Aerospace embedded systems

Recent publications:

- LaveenSundararaj, PalanisamyVellaiyan, "Search Theory based routing in AUDTHMN". International Journal of Computer Science and Network Security, Korea, Volume 11, Number 3, March 2011. ISSN: 1738-7906.
- LaveenSundararaj, PalanisamyVellaiyan, "DTN Routing based on Search Theory - An Overview". International Journal of Computer Science and Network Security, Korea, Volume 10, Number 11, November 2010. ISSN: 1738-7906.
- LaveenSundararaj, PalanisamyVellaiyan, "Delay Tolerant Networking routing as a Game Theory problem - An Overview", International Journal of Computer Networks, Kuala Lumpur, Volume 2, Issue 3, July 2010. ISSN: 1985-4129.
- LaveenSundararaj, PalanisamyVellaiyan, "Delay Tolerant Network Routing based on Rendezvous value (R) - A Theoretical Overview", European Journal of Scientific Research, London, Vol 43 Issue 2 June 2010, ISSN: 1450-216X / 1450-202X.
- LaveenSundararaj, PalanisamyVellaiyan. "An Overview of Alagappa University Delay Tolerant Water Monitoring Network". International Journal of Computer Science and Network Security, Korea, Volume 10, Number 5, May 2010. ISSN:1738-7906.
- LaveenSundararaj, PalanisamyVellaiyan, "Routing among Vallanadu blackbucks", DTNRG meet at Google, July 2012, Google HQ, California, USA.
- LaveenSundararaj, PalanisamyVellaiyan, "Few Solution Concepts for Game Theory routing in AUDTWMN using Gambit", ICINC 2010: International Conference on Intelligent Network and Computing, Kuala Lumpur, Malaysia, 26-28 November 2010
- LaveenSundararaj, PalanisamyVellaiyan, "Throughput Enhancement in AUDTWMN using Throwboxes - An Overview", ICIWE 2010 : International Conference on Internet and Web Engineering, Singapore, August 25-27, 2010. ISSN: 2070-3740 & ISSN: 2070-3724.
- LaveenSundararaj, PalanisamyVellaiyan, "DTN Work Update", DTNRG meeting, March 2009, a NASA event, Google HQ, California, USA.

Total Publications:15,**Total Citation:**4

Name   : **Dr. PL. CHITHRA**
Designation   : Professor in Computer Science
Address   : University of madras
                     Gindy Campus
                     Chennai- 600 025
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Email   : chitra.cs@unom.ac.in

Educational qualification:

- Ph.D., Computer Science
- M. Phil., Computer Science
- MCA.,Alagappa University, Karaikudi.

Professional experience:

- Professor of Computer Science in University of Madras, Chennai – 600 025
- Teaching Experience: 28 years
- Research Experience: 20 years

Area of Research:

- Digital Image Processing, Pattern Recognition

Additional Responsibilities:

- Board of Studies member at Stella Maris College, Women's Christian College, Loyola College, Ethiraj College for Women of UG and PG Computer Science since 2018.
- Coordinator - "Refresher Course in Computer Application & Information Technology, Batch –VIII"
- Coordinator for conducting UGC NET, SLET couching for SC /ST and OBC students in Dec - 2014 & Dec – 2015
- Convener - National Conference on Recent Trends in Intelligent Systems (RTIS'15) held on March 12 – 13, 2015.
- Coordinator for IDE MCA & M. Sc I.T course in Madras University for 3000 PG students PCP classes conducted during 2001 – 2004

Recent Publications:

- Fruits Classification Using Image Processing Techniques PL Chithra, M Henila International Journal of Computer Sciences and Engineering, 2018

- Pristine PixCaptcha as Graphical Password for Secure eBanking Using Gaussian Elimination and Cleaves AlgorithmPLChithra, K Sathya2018 International Conference on Computer, Communication, and Signal, 2018

- Feature Based Multiple Vehicle License Plate Detection and Video Based Traffic Counting PLCB Prashanthi Springer Nature Singapore Pte Ltd 2, 918–931,2018

- A Novel Password Encryption using Wedges Algorithm with QR Code PL Chithra, K Sathya International Journal of pure and applied Mathematics 119 (7), 857-861, 2018

- Effective lossy and lossless color image compression with multi layer perceptron PL Chithra, AC TamilMathiInternational Journal of Engineering and Technology 7, 9-14,2018

Total Citation: 42 **h- index**: 4

Name	: Dr.V.PALANISAMY
Designation	: Professor & Head
Address	: Department of Computer Applications
	Science Campus, Alagappa University,
	Karaikudi – 630 003, Tamil Nadu, India.
Phone	: +91 9443443383
Email	: vpazhanisamy@yahoo.co.in

Educational Qualifications:
- Completed M.C.A in 1990
- Completed Ph.D in 2005
- Completed M.Tech (Adv.IT) in 2009

Professional experience:
- Lecturer (8 years from 1990 - 1998), Lecturer (senior scale) (5 years from 1998 to 2003)
- Lecturer(selection grade) (2 years from 2003 to 2005)
- Reader (1 year from 2005 to 2006)
- Associate professor (2 years from 2006 to 2008), Associate Professor and Head i/c (1 year 2008)
- Chairperson – School of Computer Science (8 years from 2008 to 2016)
- Professor and Head (10 years from 2009 to till date)

Areas of Research:
- Network Security, Biometrics
- Data mining, Ad-Hoc Networking
- Image processing

Additional Responsibilities:
- Head of the Department
- Dean - Student's Affairs
- Nodal Officer – National Fellowship scheme for Tribal Affairs, NSS Programme Officer.

Honours and Awards:
- Appreciation award from Alagappa University on 25-03-2017 for acquiring Research Award given by UGC, New Delhi
- Recognized by the Alagappa University for Gold Medal and citation worth of amount equivalent to the basic salary in recognition of UGC Research Award
- UGC-Research Award for the year 2016-18, UGC, New Delhi
- Alagappa University Letter of Appreciation for UGC Research Award

Recent publications:
- Comparative Analysis of Finger Vein Pattern Feature Extraction Techniques: An Overview- International Journal of Computer Sciences and Engineering, Vol.7, Issue.5, pp.915-920, June-2019.
- Defeating Jamming Attack in Wireless Network Techniques International Journal of Computer Sciences and Engineering, Vol.7, Issue.5, pp.1384-1388, June-2019.
- An Review on Ear Recognition Techniques Based On Local Texture Descriptors International Journal of Computer Sciences and Engineering, Vol.7, Issue.5, pp.1583-1587, June-2019.
- Performance Improvement in Fingerprint Feature Extraction Using Minutiae Local Triangle Feature set. IEEE Digital Xplore –ISBN: 978-1-5386-9439-8. 2018. May-2019.
- An improved method for generating biometric-cryptographic system from face feature.   IEEE Digital Xplore- ISBN: 978-1-5386-9439-8. 2018. May-2019.
- Minor finger knuckle print image edge detection using second order derivatives. IEEE Digital Xplore- ISBN: 978-1-5386-9439-8-2018. May-2019.
- A Iris Scanner Based Secure Identification Using LDA Techniques Based Voting System International Journal of Advanced Research in Education & Technology (IJARET) Volume 5, Issue 3, ISSN: 2394-2975 September-2018.

   Cumulative Impact factor: 67 **Total Citation**: 290 **h- index**:10**i10- index**   : 10

Name   : Dr.K.Mahesh
Designation   : Professor
Address   : Department of Computer Applications
                  Science Campus
                  Alagappa University
                  Karaikudi-630004
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Email   : mahesh.alagappa@gmail.com

Educational qualification:

- Completed M.C.A in 1988
- Completed M.Phil in 2004
- Completed Ph.D in 2014

Professional experience:

- Lecturer (8 years from 10-11-1990 to 26-07-1998)
- Lecturer(senior scale) (5 years from 27-07-1998 to 26-07-2003)
- Lecturer(selection grade) (3 years from 27-07-2003 to 26-07-20060
- Associate professor (8 years from 27-07-2006 to 09-12-2014)
- Professor (10-12-2014)

Area of Research:

Video processing and image processing

Additional Responsibilities:

- NSS Programme officer, Alagappa University, Karaikudi
- Cultural coordinator, Cultural Club,Alagappa University, Karaikudi
- Warden, PG Men's Hostel, Alagappa University, Karaikudi

Honours and Awards:

- Received Certificate of Commemoration for completing 25 years of unblemished service in Alagappa University
- Letter of Appreciation, Co-ordinator-Cultural Club. 2018

Recent publications:

- M.Ramesh, Dr.K.Mahesh, "A Preliminary Investigation on a Novel Approach for Efficient and Effective Video Classification Model",International Journal of Computer Sciences and Engineering, Vol.-7, Special Issue, 5, March 2019 E-ISSN: 2347-2693.
- KR.Seethalakshmi, N.Geetha, Dr.K.Mahesh "A Review on Video Encryption Techniques" International Journal of Advanced Research in Mechanical Engineering and Technology, Volume 3, Issue 1, April 2019 ,ISSN 2456-6446.
- D.Mohanapriya, K.Rajalakshmi, N.Geetha, N.Gaythri and Dr.K.Mahesh, "Video Processing-Challenges and Future Research", Comprehensive Advanced Specific Summarised Studies (CASS) May 2019 – Vol. 3, Issue- 1, Addendum 10 (Special Issue) , PP:47-59, CASS-ISSN:2581-6403 (**UGC Approved Journal No:40934**)
- N.Geetha, Dr. K. Mahesh "RGB Component Encryption of Video using AES-256 Bit Key" in "Proceeding of the International Conference on Computer Networks, Big Data and IoT (ICCBI - 2018) Chapter No: 83 Chapter DOI:10.1007/978-3-030-24643-3_83" **Published by –Springer Nature**
- N.Gayathri**,** Dr. K. Mahesh "A Generic Approach for Video Indexing" in "Proceeding of the International Conference on Computer Networks, Big Data and IoT (ICCBI - 2018) Chapter No: 84 Chapter DOI:10.1007/978-3-030-24643-3_84" **Published by –Springer Nature**

Cumulative Impact factor: 3.39, Total Citation: 105, h- index: 5, i10- index: 1

Name	:	**Dr.P.Eswaran**
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Educational Qualifications:
- Ph.D. Computer and Information Technology, ManonmaniamSundaranar University.
- M.Tech. Computer and Information Technology, ManonmaniamSundaranar University.
- M.Sc. Computer Science and Information Technology, Madurai Kamaraj University.
- B.Sc. Botany, Madurai Kamaraj University.

Professional Experience:
- Assistant Professor, Alagappa University, Karaikudi – 630003, from 31.05.2012 onwards
- Assistant Professor, PSN College of Engineering and Tech., Sep. 2010 to 30th May 2012
- Guest Lecturer, ManonmaniamSundaranar University. July 2005 toNovember 2005.
- Teaching Experience : 9 Years and 5 Months
- Research Experience : 13 Years

Honours and Awards:
- Received **Junior Research Fellowship Award** from University Grants Commission, New Delhi.
- Received **USRF Award** (University Stipendiary Research Fellowship)fromManonmaniamSundaranar University, Tirunelveli.
- Received **Best Volunteer Award – 2002** from MannarThirumalaiNaickar College, Madurai.
- **Honored for Secured** First Place in **Taluk Level Tamil Training Contest,** Periyakulam Taluk.1994. Conducted by Tamil Nadu Tamil Teacher Association.

Areas of Research
- Digital Image Processing, Data Mining .

Additional Responsibilities:
- Coordinator – Coaching Scheme for NET Exam.
- Deputy Coordinator – Cultural Club, Coordinator (Dept. Level) - SWAYAM

Recent publications:
- Application of Expert System for Determining Export Quality Pepper Seeds using Website-Based Forward Chaining, International Journal of Recent Technology and Engineering, Volume-7 Issue-6, page(s): 3319-3329, May 2019, **Scopus Indexed – B Impact Factor: 5.92**.
- Active Database System Approach and Rule Based in the Development of Academic Information System, International Journal of Engineering & Technology, Vol. 7 (2.26), page(s): 95-101,May 2018, **Scopus Indexed – Impact Factor 0.77.**
- Wavelet Based Improved Coding Techniques (WBIC) for Grayscale Images using Lossy Compression, International Journal of Pure and Applied Mathematics, vol. 118, No. 8, page(s): 51-62, January 2018, **Scopus Indexed – Impact Factor 0.29.**
- RGB Based Multiple Share Creation in Visual Cryptography with Aid of Elliptic Curve Cryptography, IEEE Journal of China Communications, Vol. 14, Issue 2, page(s): 118–130, February 2017, **SCI Indexed – Impact Factor: 0.903.**
- Optimal Fuzzy Min-Max Neural Network for Medical Data Classification using Group Search Optimizer Algorithm", International Journal of Mobile Network Design and Innovation (IJMNDI), Vol. 7, No. 3/4, pp. 140-149, January 2017, **Scopus Indexed – Impact Factor: 0.21 (Inderscience)**
- RGB Based Secure Share Creation in Visual Cryptography Using Optimal Elliptic Curve Cryptography Technique, Journal of Circuits, Systems, and Computers, Vol. 25, No. 11, page(s): 1650138-1–1650138-23, November 2016, **SCI Indexed – Impact Factor: 0.481. (World Scientific)**

- Lossless Compression Algorithm Using Improved RLC for Grayscale Image Arabian Journal of Science and Engineering Vol.41, page(s): 3061–3070, March 2016, **SCI Indexed – Impact Factor: 0.224 (Springer)**

  Cumulative Impact factor:13.105, Total Citation :433, h- index:11, i10- index:12

Name   : **Dr.M.Vanitha**
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      Alagappa University
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Educational qualification:

- Ph.D., Computer Science (Mother Teresa Women's University)
- M. Phil., Computer Science (Bharathidasan University)
- M.Sc., Operations Research and Computer Applications,**NIT** (Bharathidasan University)
- M.Sc., Computer Science (Annamalai University)
- B.Sc., Mathematics,**SRC** (Bharathidasan University)
- B.Ed-,Mathematics,Annai College(Periyar University)

Professional experience:

- Assistant Professor in the Department of Computer Applications, Alagappa University, 30.01.2016 onwards.
- Assistant Professor and Head in the Department of Information Technology,J.J College of Art and Science, Pudukkottai from1.07.2015 to 29.01.2016.
- Assistant Professor in the Department of Computer Science, J.J College of Art and Science college, Pudukkottai from9.07.2012 to 30.06.2015.
- Assistant Professor and Head in the Department of Computer Science, Sri Bharathi of Art and Science college, Pudukkottai from1.07.2010 to 30.06.2012.
- Research Experience: 12 years
- Teaching Experience: 9 years

Area of Research:

- Digital Image processing, Data mining and Network Security.

Additional Responsibilities:

- Deputy Co-ordinator in "Women Empowerment Cell" at Alagappa University, Karaikudi.
- Treasurer of Alumni Association(ALUCAAA) in the Department of Computer Applications from 16.12.2016 onwards.
- NIRF-Incharge in the Department of Computer Applications, Alagappa University, Karaikudi.

Recent publications:

1. Manimaran R and Vanitha M (June 2018) " Rough Set Based Genetic Algorithm (RSBGA) For Assessing Hyperglycemia in Diabetic Patients" ,International Journal of Pure and Applied Mathematics, Volume 119 No. 15 2018, PP: 1035-1041, ISSN: 1314-3395**(Scopus)** Impact Factor : 2.13.
2. S. Mayil and Dr. M. Vanitha(June 2018) "Social Media User Profile Image Matching Technique (SMUPIMT) to Identify Profile Pictures in Social Media for Security", International Journal of Pure and Applied Mathematics, Volume 119 No. 15 2018, 1051-1058, ISSN: 1314-3395**(Scopus)** Impact Factor : 2.13.
3. U.Karthikeyan and Dr. M. Vanitha(Feb 2019) "A Study on Text Recognition using Image Processing with Datamining Techniques", International Journal of Computer Sciences and Engineering, Vol.-7, Issue-2, E-ISSN: 2347-2693,Impact Factor : 3.2.

   Number of **Ph.D** Completed: **7,** Number of **Ph.D**on going: **5**

   Total Publications: 57, **Cumulative Impact factor**: 1.75, **Total Citation**: 15, **h- index**: 2

Name	:	**Dr. A.Nagarajan**
Designation	:	Assistant Professor
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Educational qualification:

- Ph.D., Computer Science (Madurai Kamaraj University)
- M. Phil., Computer Science (Madurai Kamaraj University)
- MCA (Madurai Kamaraj University)
- B.Sc., Computer Science (Madurai KamarajUniveristy)

Professional experience:

- Assistant Professor in Department of Computer Applications, Alagappa University, 30.01.20165 onwards
- Assistant Professor in Department of Computer Applications,PSNA College of Engineering and Technology , Dindigul 01.09.2010 -29.01.2016
- Lecturer in Department of Computer Applications, PSNA College of Engineering and Technology Dindigul 02.03.2006 -30.08.2010
- Teaching Experience: 13 years
- Research Experience: 9 years

Area of Research:

- Digital image processing, Data mining, Big data

Additional Responsibilities:

- Deputy Co-ordinator, AU- IL&FS Institute of Skill Developmet, Alagappa University from 16.08.2019 Onwards
- DepuyCo-Ordinator (Swachh Bharat)Alagappa University from 19.07.2018 Onwards

Recent publications:

- Image processing techniques for analyzing CT scan images towards the early detection of lung cancer published in the journal of Bio Information
- Demonstrating Protein Analysis for cancer Disease using Approximation Algorithms" published in International Journal of Innovative Technology and Exploring Engineering (IJITEE)
- A Survey of the elements in the human body and consideration of human bio monitoring for biometric authentication" published in Journal of International Pharmaceutical Research
- A Novel Memory Bandwidth Efficient Video Compression Method in Wireless Video Sensor Network published in International Journal of Pure and Applied Mathematics
- An Expert System for Predicting the Cervical Cancer using Data Mining" published in International Journal of Pure and Applied Mathematics

Total Publications: 32, **Cumulative Impact factor**: 3.95, **Total Citation**: 13, **h- index**: 1, **i10- index**: 1

Name : **Dr.P.Prabhu**
Designation : Assistant Professor in Information Technology
Address : Directorate of Distance Education
Department of Computer Applications
Alagappa University
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Email : pprabhu70@gmail.com

Educational qualification:
- Ph.D., Computer Science (Alagappa University)
- M. Phil., Computer Science (Alagappa University)
- P.G.D.B.A Business Administration (Pondicherry University)
- M..C.A (Bharathiyar University)
- B.Sc., Computer Science (Madurai Kamaraj University)

Professional experience:
- Assistant Professor in Information Technology, Directorate of Distance Education, Alagappa University since 19/02/2009
- Lecturer, Mohamed Sathak College of Arts and Science, Sholinganallur, Chennai from 01/08/2001 – 18/02/2009.
- Lecturer, S.R.M. Arts & Science College, Kattankulathur, Chennai from 02/11/1998 – 22/09/2000
- Lecturer, V.H.N.S.N. College, Virudhunagar from 02/07/1993 – 31 /05/1994.

Area of Research:
- Data Mining

Additional Responsibilities:
- Coordinator (PCP) Alagappa University from academic year 2014-2015
- Member, Broad Based Board of Studies, M.C.A(Regular), Department of Computer Applications, Alagappa University held on 22nd and 23rd April 2019.
- Member of the Board of Studies in Computer Science of Directorate of Distance Education, Alagappa University for the period of three years from 3rd December 2015 for 3 years.
- Member, Board of Studies in B.Sc (Information Technology), Affiliated Colleges, Alagappa University, Karaikudi from 22.04.2014 for 3 years.

Recent publications:
- A Review of Diabetic Prediction Using Machine Learning Techniques, International Journal of Engineering and Techniques -July 2019.
- Deep Learning based Restricted Boltzmann Machine Business Intelligence Model, Universal Review, January 2019.
- Performance Evaluation of Image Based Authentication using Illusion-Pin for Shoulder Surfing Attack, International Journal of Computing Algorithm, June 2018.
- Performance Evaluation of Hybrid Method for Securing and Compressing Images, International Journal of Computing Algorithm June 2018.
- Complexity Analysis of Hybrid Method for Securing and Compressing Images, International Journal of Pure and Applied Mathematics, June 2018,
- Cluster Based K-NN Model for Information Retrieval of Text Documents, International Journal of Pure and Applied Mathematics, (2018).
- Image Based Authentication Using Illusion Pin for Shoulder Surfing Attack, International Journal of Pure and Applied Mathematics (2018),

Total Publications: 28, **Cumulative Impact factor**: 2.4, **Total Citation**: 46, **h- index**: 3, **i10- index**: 1

Name	: **Mr. S. Balasubramanian**	
Designation	: Assistant Professor in Computer Science(DDE)	
Address	: Department of Computer Applications	
	Alagappa University	
	Karaikudi- 600 003	
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Email	: **ssbala44@gmail.com**	

Educational qualification:

- Ph.D., Computer Science (Pursuing)
- M. Phil., Computer Science (Periyar University)
- M.C.A., Computer Applications (Alagappa University)
- B.Sc., Physics (Madurai KamarajUniveristy)

Professional experience:

- Assistant Professor of Computer Science(DDE), Department of Computer Applications, Alagappa University, 01.07.2016 onwards
- Assistant Professor of Computer Science(DDE), Directorate of Distance Education, Alagappa University, 03.07.2013 **–** 30.06.2016
- Lecturer- Computer Science, Mohamed Sathak College of Arts & Science, Chennai, 01.09.2005-30.06.2013
- Senior Faculty, SITECH, Chennai, 01.04.1999 **–** 31.08.2005
- Teaching Experience: 14 years
- Research Experience: 02 years

Area of Research:

- Cloud Computing, Fog Computing, Internet of Things, Data mining and warehousing.

Additional Responsibilities:

- Co-Ordinator (PCP) Alagappa University from 01.09.2019 Onwards

Recent publications:

- Game Theory based Offload and Migration Enabled Smart Gateway for Cloud of Things in Cognitive Fog Framework (paper accepted) – Springer.

- Enhancing the Computational Intelligence of Smart Fog Gateway with Boundary-Constrained Dynamic Time Warping based Imputation and Data Reduction (paper accepted) – Springer.

- Study of Cybercrime in Banking and Financial Sectors – International Journal of Scientific Research in Computer Science, Engineering & Information Technology (IJSRCSEIT).

Total Publications: 03, **Cumulative Impact factor**: -, **Total Citation**: -, **h- index**: -, **i10- index**: -

Name   : **Dr. K. Shankar**
Designation   : Assistant Professor
Address   : School of Computing
                 Kalasalingam Academy of Research and Education
                 Anand Nagar, Krishnankoil-626126, Tamil Nadu.
Phone   : +919942725200

Email   : shankar.k@klu.ac.in

Educational qualification:

- Ph.D., Computer Science (Alagappa University, Karaikudi)
- M. Phil., Computer Science (Alagappa University, Karaikudi)
- M.C.A., Computer Applications (Alagappa University, Karaikudi)
- B.Sc., Physics (Alagappa Government Arts College, Karaikudi)

Professional experience:

- Assistant Professor ofDepartment of Computer Science and Information Technology, Kalasalingam Academy of Research and Education, Krishnankoil, 29.05.2017 onwards
- Teaching Assistant, from August 2013 to March 2014 in Department of Computer science and Engineering, Alagappa University, Karaikudi.
- Teaching Experience: 3 years
- Research Experience: 3 years

Area of Research:

- Cryptography and Network Security, Secret Image Sharing Scheme, Healthcare Applications, Optimization Algorithms, Internet of Things

Additional Responsibilities:

- Research and development Co-Ordinator (PCP) of Department of Computer Science and Information Technology, Kalasalingam Academy of Research and Education, Krishnankoil, 29.05.2017 onwards

Recent publications:

- S.K.Lakshmanaprabu, K.Shankar, Rani S.Sheeba, AbdulhayEnas, N.Arunkumar, Gustavo Ramirez, J.Uthayakumar, "An effect of big data technology with ant colony optimization based routing in vehicular ad hoc networks: Towards smart cities", **Journal of Cleaner Production**, Volume. 217, Pages 584-593, April 2019. (Impact Factor: 6.395)
- Mohamed Elhoseny, K. Shankar, J. Uthayakumar, "Intelligent Diagnostic Prediction and Classification System for Chronic Kidney Disease", **Nature Scientific Reports**, July 2019. In Press. DOI: https://doi.org/10.1038/s41598-019-46074-2(Impact Factor: 4.011)
- Mohamed Elhoseny and K. Shankar, "Reliable Data Transmission Model for Mobile Ad Hoc Network Using Signcryption Technique", **IEEE Transactions on Reliability**, Page(s): 1-10, June 2019. In Press. DOI: https://doi.org/10.1109/TR.2019.2915800(Impact Factor: 2.888)
- Lakshmanaprabu S.K, SachiNandanMohanty, Sheeba Rani S, SujathaKrishnamoorthy, Uthayakumar J, K.Shankar, "Online clinical decision support system using optimal deep neural networks", **Applied Soft Computing Journal**, Volume 81, Page(s): 1-10, August 2019. (Impact Factor: 4.873)
- K. Shankar, Mohamed Elhoseny, E. Dhiravidachelvi, SK. Lakshmanaprabu, Wanqing Wu, "An Efficient Optimal Key Based Chaos Function for Medical Image Security", **IEEE Access**, Vol.6, Issue.1, page(s): 77145-77154, December 2018.(Impact Factor: 4.098).DOI:https://doi.org/10.1109/ACCESS.2018.2874026

Total Publications: 133, **Cumulative Impact factor**: 96.221, **Total Citation**: 1404, **h- index**: 24, **i10- index**: 44