

Sem	Part	Course	Course Title	Credits	Marks			Hrs/Week	Exam Duration
					CAM	TEE	Total		
I	I	Language	Tamil I / Hindi I / French I / Malayalam I	3	25	75	100	5	Theory TEE : 3Hrs :Practicals TEE :3Hrs
	II	English	English I	3	25	75	100	5	
	III	Core	C Programming	3	25	75	100	5	
	III	Core	C Programming Lab	3	40	60	100	6	
	III	Allied	Mathematical Foundations for Information Technology	5	25	75	100	6	
	IV	Skill Based Subject	General Awareness	2	25	75	100	3	
II	I	Language	Tamil II / Hindi II / French II / Malayalam II	3	25	75	100	5	
	II	English	English II	3	25	75	100	5	
	III	Core	Object Oriented Programming with C++	3	25	75	100	4	
	III	Core	Digital Computer Fundamentals	3	25	75	100	5	
	III	Allied	Numerical Methods	5	25	75	100	4	
	III	Skill Based Subject	Object Oriented Programming with C++ Lab	2	40	60	100	5	
	IV	Environmental Studies	Environmental Awareness	2	25	75	100	2	
	IV	Skill Based Subject	Professional Communication	2	25	75	100	4	
III	I	Language	Tamil III / Hindi III / French III / Malayalam III	3	25	75	100	5	
	II	English	English III	3	25	75	100	5	
	III	Core	Data Structures and Algorithms	3	25	75	100	4	
	III	Core	Java Programming	3	25	75	100	3	
	III	Core	Java Programming Lab	3	40	60	100	4	
	III	Allied	Computer Based Optimization Techniques	5	25	75	100	3	
	IV	Basic Tamil / Advanced Tamil	Basic Tamil - I / Advanced Tamil - I	2	100	NA	100	2	
	IV	Non - major Elective	Personality Development and Softskills		40	60			
	IV	Skill Based Subject	Professional Communication	2	25	75	100	4	
	V	Extension Activities	NSS / Computer Awareness Programme	1	Grade**			-	
IV	I	Language	Tamil IV / Hindi IV / French IV / Malayalam IV	3	25	75	100	5	
	II	English	English IV	3	25	75	100	5	
	III	Core	Relational Database Management System	3	25	75	100	4	
	III	Core	Framework Technology	3	25	75	100	3	
	III	Allied	Principles of Management	5	25	75	100	4	
	III	Skill Based Subject	Framework Technology and RDBMS Lab	2	40	60	100	4	
	IV	Basic Tamil / Advanced Tamil	Basic Tamil - II / Advanced Tamil - II	2	100	NA	100	2	
	IV	Non - major Elective	Basics in Business Process Outsourcing		40	60			
	IV	Value Education	Indian Society, People and Culture	2	25	75	100	3	
	V	III	Core	Python Programming	4	25	75	100	3
III		Core	Computer Networks	4	25	75	100	4	
III		Core	Operating Systems	4	25	75	100	4	
III		Core	Principles of Software Engineering	4	25	75	100	4	
III		Core	Open Source Software	4	25	75	100	4	
III		Elective	Elective -I	4	25	75	100	4	
III		Core	Python Programming Lab	3	40	60	100	4	
IV		Skill Based Subject	Skill Based Subject - Aptitude *	2	25	75	100	3	
VI		III	Core	Cyber Security	4	25	75	100	4
		III	Core	Mobile Application Development	3	25	75	100	4
	III	Elective	Elective-II	4	25	75	100	4	
	III	Core	Mobile Application Development Lab	3	40	60	100	4	
	III	Core	Project and Viva Voce	7	25	75	100	12	
	IV	Skill Based Subject	Skill Based Subject - Soft Skills *	2	25	75	100	2	
<b>TOTAL</b>				<b>140</b>	<b>1195</b>	<b>3105</b>	<b>4300</b>	<b>180</b>	

\* Both CAM and TEE marks will be evaluated internally.

NA-Not Applicable, Basic Tamil/Advanced Tamil - CAM only.

G. Radhakrishnan

**Dr G R DAMODARAN COLLEGE OF SCIENCE (Autonomous), COIMBATORE.**

**B.Sc (Information Technology)**

*BIII - 02*

**Effective from the academic year: 2019 - 2020** *2019 - 20*

**FIRST SEMESTER**

**CORE: C PROGRAMMING**

**Objective of the subject:** This paper provides a brief introduction to history of C as a Structured Language. It gives detailed description about syntax and semantics of C language along with concepts like preprocessor directives, arrays, functions, storage classes, string functions, pointers, structures and files.

**UNIT I:**

**(8 Hrs)**

Introduction to C language – C character set – Variables - Constant Types – C Keywords - Data types – The first program in C – Compilation and Execution – Operators - C Instructions.

**UNIT II:**

**(10 Hrs)**

Decision Control Structures: if- if-else- Nested if-else – Programs using Control Structures. Looping Control Structures: for loop-while loop-do-while loop. C Preprocessor: Features of C preprocessor-Macro Expansion- #if-#elif -#undef. Arrays: Array initialization-Single and Two dimensional arrays- programs using arrays.

**UNIT III:**

**(12 Hrs)**

Functions: Introduction to Functions – Uses of a function – Passing values between function – Recursive function – Programs using function. Storage Classes: Static-Automatic-Register and External storage classes - Importance of storage classes. Strings: Introduction -More about strings – Pointers and Strings – Standard library string functions. Two-Dimensional array of characters.

**UNIT IV:**

**(9 Hrs)**

Pointers: Introduction to Pointers – Pointers and Arrays – Pointers and Strings - Array of Pointers to Strings - Programs using Pointers.

**UNIT V:**

**(11 Hrs)**

Structures: Declaring structure - Accessing structure elements - Additional features of structure - Uses of structure - Programs using Structures - Union. Files: File Operations - File Opening Modes - Line Arguments – Programs in Files and Command Line Arguments.

**Text Books**

1. Let us C, Yashwant P. Kanetkar, BPB Publications, 5<sup>th</sup> edition 2013. (Unit I –Unit V)
2. Understanding Pointers in C, Yashwant P. Kanetkar, BPB Publications, 2009.(Unit V)
3. Mastering C, K.R Venugopal, Sudeep R Prasad, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2015

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**B.Sc (Information Technology)**

*B111-03*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**FIRST SEMESTER**

**CORE: C PROGRAMMING LAB**

**Objective of the subject:** To provide a hands-on experience by working with various concepts like functions, structures, pointers, files, preprocessor directives and command line arguments.

1. Input / Output, Variables & Expression Statements
2. Branching Statements
3. Looping Statements
4. Single & Multi Dimensional Arrays
5. Functions & Recursion
6. String Functions
7. Structures and Union
8. Pointers
9. Files
10. Preprocessor Directives
11. Command Line Arguments

**Note:** Develop a project / case study using the above applicable concepts.

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**B.Sc (Information Technology)**

*BEEE-04*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**FIRST SEMESTER**

**ALLIED: MATHEMATICAL FOUNDATIONS FOR INFORMATION TECHNOLOGY**

**Objective of the subject:** This paper focuses on logical connective, relation and functions, formal languages and automata theory, graph theory, lattice and Boolean algebra.

**UNIT I**

**(10 Hrs)**

Mathematical Logic: Connective, well-formed formula, tautology equivalence of formulas, tautological implications, duality law, normal forms, predicates, variables, quantifiers, free and bound variables. Theory and inference for statement calculus only.

**UNIT II**

**(10 Hrs)**

Relation and functions: Composition of relations, equivalence of relations – Functions – composition of functions, inverse functions, one-to-one, on-to, one to, one-on-to functions.

**UNIT III**

**(10 Hrs)**

Formal Languages and Automata: Grammars, phrase-structure grammar, context-sensitive grammar, context-free grammar, regular grammar and finite state automata – conversion of non-deterministic finite automata to finite state automata.

**UNIT IV**

**(10 Hrs)**

Lattice and Boolean Algebra: Partial ordering, poset, lattices, distributive lattices – complementary distributive lattices – Boolean algebra – Minimization of Boolean function using K-map.

**UNIT V**

**(10 Hrs)**

Graph Theory: Directed and undirected graphs, connected graphs, path, reachability, circuits, Hamiltonian paths, Euler paths – Matrix representation, incidence matrix, adjacency matrix – tree, binary tree. In-order post-order pre-order Traversals of Binary Tree (Theorems – statements only, no proof).

**Text Book**

1. Discrete Mathematical Structures with Applications to Computer Science, J.P Tremblay, R. P. Manohar, McGraw Hill, 38<sup>th</sup> reprint 2010.

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B.Sc (Information Technology)

BTFF - 05

Effective from the academic year: 2019 - 2020

2019-20

**SECOND SEMESTER****CORE: OBJECT ORIENTED PROGRAMMING WITH C++**

**Objective of the subject:** This paper highlights on the basic OOPs concepts, looping structures, control structures, concepts of objects and classes, application of these concepts in programming and functions supported by object oriented programming.

**UNIT I****(8 Hrs)**

Object Oriented Paradigm - Evolution of programming paradigms - elements of object oriented programming - Objects – Classes - Encapsulation and Data abstraction-Inheritance – Polymorphism - Stream Based I/O - Comment Line – Literals - Scope Resolution Operator - Type Conversion - Data Types - Character set- Tokens, Identifiers and Keywords – Variables - Operators and Expressions.

**UNIT II****(10 Hrs)**

Control Structures and Looping Statements. Arrays: Operations on arrays - multi-dimensional - String - Arrays of strings. Functions: Function components - Passing data to functions – return - Parameter passing - Default arguments - Inline functions - Function overloading - Recursive function - Pointers.

**UNIT III****(11 Hrs)**

Classes and Objects: Class specification - class objects - accessing class members - Defining member functions - Accessing member functions within class - Data hiding - Friend functions and Friend classes - Static data and member functions - Object initialization and cleanup – Constructors: Parameterized constructors - Constructor overloading - Constructor with default arguments - Dynamic initialization through constructor - Copy constructor - Destructor Dynamic Objects - Pointers to objects - Array of objects - this pointer.

**UNIT IV****(11 Hrs)**

Operator Overloading – Unary operator overloading - Operator return values - Increment/decrement operators - Binary operator overloading - Arithmetic operators - Arithmetic assignment operators. Inheritance: Derived class declaration - Forms of inheritance - Inheritance and member accessibility - Multilevel-Multiple - Hierarchical inheritance. Virtual Function: Definition of virtual functions - Need for virtual functions - Pure virtual functions - Virtual destructors - Rules for virtual functions.

**UNIT V****(10 Hrs)**

Streams Computation with Console – Formatted and Unformatted I/O operations - Stream Computation with Files: Opening and closing of files - Testing for errors - File modes- Sequential access - File I/O with fstream class - Random access - Exception Handling: Exception handling model - List of Exceptions - Catch all Exceptions.

**Text Books**

1. Mastering C++, K.R. Venugopal, Rajkumar Buyya, T.Ravishankar, Tata McGraw Hill Publishing Company Limited, 2013. (Unit I – Unit V).
2. The Complete Reference in C++, Herbert Schildt, Tata McGraw Hill Publishing Company Limited, 2008, 4th Edition.



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**B.Sc (Information Technology)**

*BFFF - 06*

**Effective from the academic year: 2019 - 2020**

*2019 - 20*

**SECOND SEMESTER**

**CORE: DIGITAL COMPUTER FUNDAMENTALS**

**Objective of the subject:** To provide the basic knowledge on computer arithmetic, machine language instruction set, counters, input/output and system bus design and memory systems. The objective is to provide the students an insight into the fundamental building blocks of a computer.

**UNIT I**

**(10 Hrs)**

Number Systems and Codes: Decimal, Binary, Octal, Hexadecimal - Conversion from one to another - Binary Addition, Subtraction, Multiplication and Division - Negative Numbers- Use of Complements to Represent Negative Numbers - Binary Number Complements - Complements in other Number Systems. Codes: BCD Weighted - Excess Three - Gray- Error Detection Codes.

**UNIT II**

**(10 Hrs)**

Logic gates and Boolean Algebra: Basic Logic Gates - AND, OR, NOT, NAND, NOR, EX-OR and their Truth Tables – NAND and NOR Implementation – Basic theorems and properties of Boolean Algebra – Canonical and Standard forms - Simplification of Boolean functions using Karnaugh Maps (Including Don't care conditions).

**UNIT III**

**(9 Hrs)**

Combinational Logic Circuit: Half Adder - Full Adder - Parallel Binary Adder - Binary Coded Decimal Adder –Half Subtractor – Full Subtractor – Shift Micro Operation - Logic Micro Operation – Arithmetic Micro Operation - Multiplexers –Demultiplexers – Decoders - Encoders.

**UNIT IV**

**(11 Hrs)**

Sequential Logic: Flip-flops – RS, JK, Master Slave, D Flip-flop- Register - Shift Register- Counters- Ripple Counters- Synchronous Counters.

**UNIT V**

**(10 Hrs)**

Memory and I/O Devices: Random Access Memories - Static and Dynamic Random Access Memories - Read Only Memories - Magnetic Disk Memories. Input/Output Devices- Punched Tape-Tape Readers - Punched Cards- CD – DVD - Blu-ray - USB - LCD – LED - Character Recognition – Keyboards - Printers - 3D Printers.

**Text Books**

1. **Digital Logic and Computer Design**, M.Morris Mano, Prentice Hall, 14<sup>th</sup> Impression 2012.
2. **Digital Computer Fundamentals**, Thomas C.Bartee, Tata McGrawHill, Sixth Edition, 23<sup>rd</sup> Reprint, 2011.

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**B.Sc (Information Technology)**

*BIII - 07*

**Effective from the academic year: 2019 - 2020**

*2019 - 20*

**SECOND SEMESTER**

**ALLIED: NUMERICAL METHODS**

**(Excluding derivations)**

**Objective of the subject:** This paper focuses on theory of equations, curve fitting, method of false position, interpolation and solving differential equations.

**UNIT I**

**(10 Hrs)**

Theory of Equations: Polynomial equation – Fundamental Theorem of algebra - Relation between the Roots and the coefficients of Equations - Decreasing and Increasing of Roots - Horner's method for finding the Roots of Polynomial Equations.

**UNIT II**

**(10 Hrs)**

Curve fitting: Method of Least Squares-Fitting a Straight line and Second degree parabola. Difference Equations: Order and degree of a difference equation - Solution of first and Second Order Linear Finite Difference Equations with Constant Coefficients.

**UNIT III**

**(10 Hrs)**

Numerical Solutions of Algebraical and Transcendental Equations: Bolzano's Bisection Method- Iterative method -Method of False Position - Newton Raphson method for finding real roots.

Iterative method for Eigen values: Power Method (dominant Eigen values only).

**UNIT IV**

**(10 Hrs)**

Interpolation: Newton's Forward and Backward Interpolation Formula – Lagrange Interpolation.

Numerical Integration: Trapezoidal rule - Simpson's (1/3)<sup>rd</sup> rule - Simpson's (3/8)<sup>th</sup> rule – Weddle's rule.

**UNIT V**

**(10 Hrs)**

Solving Simultaneous Linear Algebraic Equations: Gauss Elimination-Gauss Jordan – Gauss Jacobi Method - Gauss Siedel methods.

Numerical solutions of Ordinary Differential Equations: Taylor's Series method –Euler's and Modified Euler's method – Runge-Kutta method of Fourth order.

**Text Books**

1. Numerical Methods in Science and Engineering, M.K.Venkatraman, The National Publishing Company, Chennai, 2007, 5<sup>th</sup> Edition.
2. Numerical Methods, P.Kandasamy, K.Thilagavathy, K.Gunavathy, S.Chand and Co, New Delhi, 2008.

Subject code:

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**B.Sc (Information Technology)**

*BIII - 08*

**Effective from the academic year: 2019 - 2020** *2019 - 20*

**SECOND SEMESTER**

**SKILL BASED SUBJECT**

**OBJECT ORIENTED PROGRAMMING WITH C++ LAB**

**Objective of the subject:** To provide a hands-on experience on implementing the OOPS concepts like overloading, virtual function, inheritance, files and pointers.

1. Classes & Objects
2. Function overloading
3. Operator overloading
4. Inheritance and virtual function.
5. String Manipulations
6. Constructors & Destructors
7. Pointers
8. File using Classes and Objects
9. Command Line Arguments, Friend and Inline function
10. Exception Handling

**Note:** Develop a project / case study using the above applicable concepts.



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**B.Sc (Information Technology)**

*8111-09*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**THIRD SEMESTER**

**CORE: DATA STRUCTURES AND ALGORITHMS**

**Objective of the subject:** This subject highlights on Introduction to Data Structures, Stack and Queue algorithms, algorithms for Searching, Sorting, Trees and Manipulation of data structures.

**UNIT I**

**(8 Hrs)**

Basic Concepts: Algorithm Specification – Performance analysis. Arrays, Records and Pointers: Linear arrays – Representation of linear arrays – Traversing linear array – Inserting and deleting – Multidimensional arrays – Pointers – Records – Matrices.

**UNIT II**

**(9 Hrs)**

Linked list: Linked lists – Representation in memory – Traversing linked list – Garbage collection – Insertion and deletion in linked list – Header linked lists – Two-way lists.

**UNIT III**

**(11 Hrs)**

Stacks, Queues and Recursion: Stacks – Array representation of stacks – Linked representation of stack – Arithmetic expressions – Recursion – Tower of Hanoi – Implementation of recursive procedure by stacks – Queue – Linked representation of Queues – Deques – Priority Queues.

**UNIT IV**

**(12 Hrs)**

Trees: Introduction – Binary trees – Representing binary trees in memory – Traversing binary trees – Traversing algorithm using stack – Threads - Binary search trees – Searching, Inserting and Deleting in a binary search tree.

**UNIT V**

**(10 Hrs)**

Searching: Sequential – Binary – Fibonacci Search. Sorting - Bubble sort – Quick sort – Insertion sort – Selection sort – Merging – Merge sort – Radix sort – Heap sort.

**Text Books**

1. Fundamental of Data Structures in C, Ellis Horowitz and Sartaj Sahni, Anderson- Freed, Galgotia Publications, 2008.(Unit I).
2. Data Structures Schaum's Outlines, Seymour Lipschutz, G.A Vijayalakshmi Pai, Tata McGraw-Hill Companies, 2006, Indian Adapted Edition.(Unit II, III, IV, V).

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**B.Sc (Information Technology)**

*BIII-10*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**THIRD SEMESTER**

**CORE: JAVA PROGRAMMING**

**Objective of the subject:** The objective is to learn the Java programming language along with its syntax, idioms, patterns, and styles. To understand object oriented programming and to learn the essentials of the Java class library and event driven Graphical User Interface (GUI) programming.

**UNIT I**

**(9 Hrs)**

Object - Oriented Programming – Encapsulation – Inheritance – Polymorphism – Java History – Java Features – Java Programming Techniques – Lexical issues – Variables – Types – Arrays – Operators.

**UNIT II**

**(9 Hrs)**

Branching: If-else, Break, Switch, Return statements – Looping: while, do-while, for, comma statements, Continue – Classes: Object references – Instance Variables – New operator - Dot operator – Method declaration – Method calling – This operator – Constructors – Method overloading – Inheritance – Super class – Method overriding – Dynamic method dispatch – Final, Finalize, Static, Abstract classes.

**UNIT III**

**(11 Hrs)**

Packages: The package statement – Compiling classes in packages: the import statement – Access protection – Interface: The interface statement – The implements statements – Variables in interfaces – String handling – Constructors – String creation – String Concatenation – Character Extraction – Exception handling fundamentals: Exception type – Uncaught Exceptions – Nested try statements.

**UNIT IV**

**(11 Hrs)**

The Java thread model – Thread Priorities, Synchronization, Messages – Thread – Runnable – Inter Thread communication – Thread API Summary. Input and output – File – Directory – File name filter – Input stream – Output stream – File streams – Applets: HTML applet tags – Order of Applet initialization – Sizing graphics – graphic methods – Font manipulation.

**UNIT V**

**(10 Hrs)**

Event Handling: Two Event Handling Mechanisms – The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces – Using the Delegation Event Model – Adapter Classes – Inner Classes. AWT classes: Layout Manager, Panel. Real time Applications of Java.

**Text Books**

1. The Java Handbook, Patrick Naughton, Tata McGraw Hill, 2008.
2. The Complete Reference – Java 2, Patrick Naughton & Herbert Schildt, Tata McGraw Hill Publishing Company, 2014, 9<sup>th</sup> Edition.

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**B.Sc (Information Technology)**

*BFFF -11*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**THIRD SEMESTER**

**CORE: JAVA PROGRAMMING LAB**

**Objective of the subject:** To provide a hands-on experience in developing applets, packages, multi-threading, exceptions, interface and inheritance.

1. Inheritance.
2. Interface.
3. User defined Packages.
4. User defined Exceptions.
5. Multi-threaded programming.
6. String Operations.
7. Arithmetic operations using applets.
8. Applet Graphics Drawing.
9. Applet AWT Controls.
10. AWT Event handling.
11. GUI for user registration using applets.
12. Create a webpage.

**Note:** Develop a project / case study using the above applicable concepts.

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**B.Sc (Information Technology)**

*BFFF-12*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**THIRD SEMESTER**

**ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES**

**Objective of the subject:** This paper gives optimization techniques like linear programming, transportation problem, game theory, replacement models, waiting line theory, PERT & CPM methods.

**UNIT I**

**(12 Hrs)**

Linear Programming - Mathematical Formulation of the Linear Programming Problem – Graphical Solution Method - Simplex Method, Big - M Method, Dual Simplex Method.

**UNIT II**

**(10 Hrs)**

The Transportation problem: Initial basic feasible solution- North-West Corner Rule, Least Cost Method & VAM – Moving towards optimality. Assignment Problem: Hungarian method.

**UNIT III**

**(10 Hrs)**

Game Theory: Concept of Pure and mixed strategies – solving  $2 \times 2$  matrixes with and without saddle point – Graphic solution of  $2 \times n$  and  $m \times 2$  games.

Replacement models: Replacement of Equipment that deteriorates gradually: Replacement policy when value of money does not change with time – Replacement policy when value of money changes with time. Replacement of Equipment that fails suddenly.

**UNIT IV**

**(8 Hrs)**

Queueing Theory: Queuing system – Elements of a Queueing system – Queuing models: (M/M/1): ( $\infty$ /FIFO) and (M/M/1): (N/FIFO) Only.

**UNIT V**

**(10 Hrs)**

PERT & CPM: Network – Basic components – Rules of Network construction. Critical Path Analysis : Forward pass & Backward pass calculations – Critical Path. PERT calculations.

**Text Books**

1. Operations Research, Kantiswarup , P.K. Gupta, ManMohan , Sultan Chand & sons – 2012. (Sixteenth Edition).
2. Problems in Operation Research (Methods and Solutions), Man Mohan, P.K. Gupta, Sultan Chand & sons – 2004 Reprint

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**B.Sc (Information Technology)**

*BFFF-13*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**FOURTH SEMESTER**

**CORE: RELATIONAL DATABASE MANAGEMENT SYSTEM**

**Objective of the subject:** This course is an introductory course on database management systems. The course deals with the notion of database systems, from the user point of view. The objective of the course is to introduce the fundamental concepts of database systems, acquaint the students with the use of current relational database systems, and build a solid foundation for advanced studies in database area.

**UNIT I:**

**(8 Hrs)**

Introduction: Database System Applications - Purpose of Database systems - View of Data – Database Languages – Transaction Management – Database Architecture - Database Users and Administrator.

**UNIT II:**

**(10 Hrs)**

Database design and the E-R model: The Entity Relationship model – Constraints – Removing Redundant attributes in Entity sets - E-R diagram - Extended E-R features. Introduction to the Relational model: Structure of Relational Databases – Database Schema – Keys – Relational Query Languages - Relational operations - Open Source RDBMS and proprietary RDBMS.

**UNIT III:**

**(10 Hrs)**

Relational database design: Features of good relational designs – Atomic domains and First Normal Form – Decomposition using functional dependencies – Functional dependency theory – Decomposition using multivalued dependencies.

**UNIT IV:**

**(12 Hrs)**

Data Definition Language: Data Types – Constraints – Creating table – Displaying table information – Altering an existing table – Dropping a table – Renaming and Truncating. Data Management and Retrieval: DML. Functions and Grouping: Built in functions - Grouping data. Multiple Tables: Joins and Set operators. Subqueries: Nested Queries

**UNIT V:**

**(10 Hrs)**

PL/SQL: A Programming Language: PL/SQL block structure – Data types – variable declaration - Cursors and Exceptions - Named blocks: Procedure, Function, Triggers. Introduction to NoSQL.

**Text Books**

- 1.Database System Concepts, Henry F.Korth, Abraham Silberschatz, & S. Sudarshan, Tata McGraw-Hill Publishing Company, 2011, 6<sup>th</sup> Edition.(Unit I , II ,III)
2. Database Systems Using Oracle, Nilesh Shah, Pearson, 2<sup>nd</sup> Edition, 2016. (Unit IV, V)

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**B.Sc (Information Technology)**

*8111-14*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**FOURTH SEMESTER**

**CORE: FRAMEWORK TECHNOLOGY**

**Objective of the subject:** This paper concentrates on controls used in web server, database programming, binding of data and templates used in framework.

**UNIT I:** **(12 Hrs)**

The .NET Framework: Web Development – The .NET Framework - .NET Languages – The Common Language Runtime - .NET Class Library. Developing ASP.NET Applications: Creating Websites – Designing a web page –The anatomy of a web form – Writing Code – Debugging.

**UNIT II:** **(9 Hrs)**

Web Server Controls: Basic Web Server Controls : Label – Textbox - Button Control – Link Button – Check Box – Radio Button – Hyperlink – Image Control. Data list Web Server Controls: CheckBoxList - RadioButtonList – DropDownList – List Box.

**UNIT III:** **(9 Hrs)**

Rich Web Controls: Other Web Server Controls - Calendar – AdRotator – Validation Controls. IE Web Controls : Treeview – Tool Bar – Tabstrip – Multipage Control.

**UNIT IV:** **(10 Hrs)**

Working With Data: System.Data & System.Data.OLEDB Namespaces: OLEDB Connection Class – OLEDB Command Class – OLEDB Transaction Class - OLEDB Data Adapter Class – OLEDB Data Set Class – Simple Application. System.Data - SQLClient Namespace : Connecting to a SQL Server Database – Manipulating data in SQL Server Database – Retrieving data from the SQL Server Database.

**UNIT V:** **(10 Hrs)**

Working with data grids: Using a data grid example - Using the columns property - Paging data grid-Sorting data grid. Using Templates: Templates: Repeater control - Data list control - Data grid control. Creating Templates: Combining templates with the repeater control - Combining templates with data list control - Combining templates with the Data grid control.

**Text Books**

1. Beginning ASP.NET 4 in VB 2010, Matthew MacDonald, Apress, Berkeley, CA, USA, 2011.
2. ASP.NET Bible, Mridula Parihar, Wiley Publishing Inc.USA-2006.

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B.Sc (Information Technology)

B111 - 15

Effective from the academic year: 2019 - 2020

2019-20

#### FOURTH SEMESTER

#### ALLIED: PRINCIPLES OF MANAGEMENT

**Objective of the subject:** This paper highlights on introduction to management concepts and its nature. Functional areas of management such as planning, organization, staffing, motivation and controlling are also covered

##### UNIT I

(10 Hrs)

Management – Meaning – Nature- As art, science and profession - Difference between Administration and Management – Levels of Management. Planning: Nature – Importance - Advantages and limitation of planning - Process of planning.

##### UNIT II

(10 Hrs)

Organization – Meaning – Types of Organization - Delegation of Authority – Types – Functions. Departmentation: Meaning – Bases of Departmentation - Decentralization.

##### UNIT III

(10 Hrs)

Personnel Planning – Recruitment: Meaning - Internal Source - External Sources - Evaluation of external source. Selection - Training and Development.

##### UNIT IV

(10 Hrs)

Motivation: Meaning – Process - Nature – Importance - Theories. Leadership: Significance – Meaning - Nature-Leadership Vs Headship - Different Approaches.

##### UNIT V

(10 Hrs)

Controlling: Meaning - Factors – Working - Characteristics. Control Devices: Traditional device - Budgetary, cost, production, inventory, profit and loss controls – BEP - Modern devices.

##### Text Books

1. Principles of Management, Dinkar Pagare, Sultan Chand, Reprint, 5<sup>th</sup> Edition, 2013. (Unit I - V).

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**B.Sc (Information Technology)**

**Effective from the academic year: 2019 - 2020**

*BTEF - 16*

*2019-20*

**FOURTH SEMESTER**

**Skill Based Subject: FRAMEWORK TECHNOLOGY and RDBMS LAB**

**Objective of the subject:** This paper provides an experience on creating webpages, manipulation of web controls, implementing the validation controls and Emphasis is also given on database connectivity and manipulation of data through this connectivity.

**Framework Technology**

1. Creation of a Simple ASP.NET Web Page.
2. Creating and manipulation with Web Controls.
3. Create and manipulate with Rich Web Controls (AdRotator)
4. Creation and manipulation of Validation controls.
5. Displaying Data in the DataGrid.
6. Manipulation of data using SQL Server Database.
7. Database Connectivity using ADO.NET

**RDBMS**

8. Table creation using Integrity Constraints and apply DDL and DML commands.
9. Program using Built-in functions.
10. Programs using Cursors.
11. Programs using Exception Handling.
12. Programs using Procedures and Functions.
13. Programs using Triggers.

**Note:** Develop a project / case study using the above applicable concepts.

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**FIFTH SEMESTER**

**CORE: PYTHON PROGRAMMING**

**Objective of the subject:** The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, installing and running the Python interpreter, Tuples, Class and Objects, Files using the Python programming language.

**UNIT I**

**(8 Hrs)**

**Introduction to Python:** Python - Features – Execution - Viewing the Byte Code - Flavors of Python - Python Virtual Machine (PVM) - Frozen Binaries - Memory Management in Python - Garbage Collection in Python - Comparisons between C and Python - Comparisons between Java and Python.

**Writing Our First Python Program:** Installing Python for Windows - Setting the Path to Python - Executing a Python Program.

**UNIT II**

**(8 Hrs)**

**Datatypes in Python:** Comments in Python – Docstrings – Variables – Data types – Built-in datatypes - bool Datatype - Sequences in Python – Sets - Literals in Python – Characters – User defined Data types - Constants - Identifiers and Reserved words - Naming Conventions.

**Operators in Python:** Arithmetic - Assignment - Unary Minus - Relational - Logical - Boolean - Bitwise - Membership - Identity - Precedence and Associativity. **Input and Output:** Output statements - Input Statements - Command Line Argument.

**UNIT III**

**(12 Hrs)**

**Control Statements:** The if Statement - A Word on Indentation - The if ... else Statement - The if ... elif ... else Statement - The while Loop - The for Loop - Infinite Loops - Nested Loops - The else Suite - The break Statement - The continue Statement - The pass Statement - The assert Statement - The return Statement.

**Arrays in Python:** Advantages - Creating - Importing the Array Module - Indexing and Slicing - Processing the Arrays - Types of Arrays - Working with Arrays using numpy - Creating Arrays: array() - linspace - logspace - arrange() – Function - Creating Arrays using zeros() and ones() Functions - Mathematical Operations on Arrays - Comparing - Aliasing - Viewing and Copying - Slicing and Indexing - Dimensions of Arrays - Attributes of an Array - Working with Multi-dimensional Arrays - Indexing - Slicing.

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**UNIT IV**

**Strings and Characters:** Creating Strings – String Functions - String Testing Methods - Formatting the Strings - Working with Characters.

**Functions:** Function Versus Method - Defining a Function - Calling a Function - Returning Results from a Function - Returning Multiple Values - Functions are First Class Objects - Pass by Object Reference - Formal and Actual Arguments - Positional Arguments - Keyword Arguments - Default Arguments - Variable Length Arguments - Local and Global Variables - The Global Keyword - Passing a Group of Elements to a Function - Recursive Functions - Anonymous Functions or Lambdas.

**UNIT V****(10 Hrs)**

**Lists and Tuples:** List - Creating Lists using range() Function - Updating the Elements of a List - Concatenation - Repetition of Lists - Membership in Lists - Aliasing and Cloning Lists - Methods to Process Lists - Nested Lists. Tuples: Creating Tuples - Accessing the Tuple Elements - Basic Operations on Tuples - Functions to Process Tuples - Nested Tuples.

**Files:** Persistence - Opening files - Text files and lines - Reading files - Searching through a file – Using try, except and open - Writing files.

**Text Books**

1. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech Press, October 2016.
2. Python for Everybody, Exploring Data Using Python, Charles Severance, Kindle Publication, 2016.



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**FIFTH SEMESTER**

**CORE: COMPUTER NETWORKS**

**Objective of the subject:** This paper focuses on the reference models, issues of different layers of the OSI reference model layers and underwater networking concepts. This subject helps in understanding the concepts of **Computer Network Engineering and Underwater Networks**.

**UNIT I:**

**(10 Hrs)**

Introduction: Use of computer networks – Network Hardware – PAN, LAN, MAN WAN, Internetworks – Network software - Protocol hierarchies – Design issues for the layers – Connection-Oriented versus Connectionless Service – Service Primitives – Reference models - the OSI reference model – the TCP/IP reference model. Types of networks: Wireless and mobile networks.

Switching systems: Circuit switching – message switching – Packet switching. Network Ports: Connectors – Switch – Jack. Network Boosters. Critical areas of the Network: Security – Traffic Management – Real-Time monitoring – Scalability

**UNIT II:**

**(10 Hrs)**

The Physical Layer: Transmission Media – Wireless transmission – Communication satellites. Data link layer: Data link layer design issues – Error detection and correction – Elementary data link protocols – Sliding window protocols.

**UNIT III:**

**(10 Hrs)**

Network Layer: Network layer design issues - Routing algorithms – The optimality principle – Shortest path routing – Flooding – Distance vector routing. Transport layer: The transport service – Elements of transport protocol. Application Layer: Domain Name System – The DNS Name space – Domain resource records – Name servers - The world wide web.

**UNIT IV:**

**(10 Hrs)**

Introduction: Underwater Networking – Underwater Networking Architecture - Types of Cables - Modems - Protocols - Operating System - Monitoring systems. Network monitoring: deployment – relocation – recovery

**UNIT V:**

**(10 Hrs)**

Applications of Underwater Networking: Autonomous underwater vehicles (AUVs) – Sea level temperature - Storm identification – Heading - storm's intensity, hail probabilities – Hail Size - causes of a Tsunami – timing and intensity – centre of the Tsunami - direction.

Subject code:

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**Text Books**

1. Computer Networks, Andrew S. Tanenbaum & David J. Wetherall, Pearson Education, 2012, 5<sup>th</sup> Edition.
2. Data and Computer Communications, William Stallings, Prentice Hall of India, 2007, 8th Edition.
3. Robert J. Urick, Principles of Underwater Sound, Peninsula Publication, Third Edition, 2013
4. Thomas Ask, Handbook of Marine Surveying, Sheridan House, Illustrated Edition, 2007.
5. Web References

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Effective from the academic year: 2019 - 2020

FIFTH SEMESTER

CORE: OPERATING SYSTEMS

**Objective of the subject:** The objective is to emphasize the need and the functionality of the operating system. The aim is to discuss the components and responsibilities of the operating systems like CPU scheduler, memory management system, I/O systems, handling concurrent processes.

**UNIT I:**

(10 Hrs)

Operating Systems Introduction – Main frame systems – Desktop systems – Multi processor systems – Distributed System – Clustered System – Real Time Systems- Handheld Systems – Feature Migration – Computing Environments.

Computer System Structures – Computer, System operation, I/O Structure, Storage Structure, Storage Hierarchy, Hardware Protection and Network Structure.

**UNIT II:**

(11 Hrs)

Operating System Structures: System Components, Operating System Services, System Calls, System Programs. Process Management: Process Concept, Process scheduling, Operations on Processes, Cooperating Processes, and Inter process Communication in Client Server Systems.

**UNIT III:**

(8 Hrs)

CPU Scheduling: Scheduling Concepts, Scheduling Algorithms. Deadlock: Deadlock Problem, Characterization, Prevention, Avoidance, Detection, Recovery.

**UNIT IV:**

(11 Hrs)

Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging Virtual Memory – Demand Paging, Page Replacement.

**UNIT V:**

(10 Hrs)

File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting, and File System Protection. Mass: Storage Structure – Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Disk Attachment, Stable – Storage Implementation, Tertiary, Storage Structure.

**Text Book**

1. Operating Systems Concepts, Silberschatz, Galvin, Gagne, John Wiley & Sons, Inc, 9<sup>th</sup> Edition, 2012 Reprint.

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**FIFTH SEMESTER**

**CORE: PRINCIPLES OF SOFTWARE ENGINEERING**

**Objective of the subject:** This subject mainly concentrates on software engineering concepts along with some of the methodologies of Testing. This paper highlights on the characteristics of software, software evolution, software models, the various phases in software design and the different types of software testing techniques.

**UNIT I**

**(9 Hrs)**

The evolving role of software – Software characteristics – Software Engineering: A layered technology. Process Models: The Waterfall model - Incremental process model - Evolutionary process model - Specialized process models.

**UNIT II**

**(9 Hrs)**

Requirements Engineering: Tasks, initiating - Analysis Model: Requirement analysis, Scenario based, Flow oriented, Class based modeling.

**UNIT III**

**(10 Hrs)**

Design Engineering: Design within the context of software, Design process and design quality – concepts - Model.

Architectural Design: Software architecture, Mapping data flow into software architecture.

**UNIT IV**

**(11 Hrs)**

Implementation issues: Introduction - Structured coding techniques: Single Entry Single Exit constructs, Efficiency considerations, Violations of Single Entry Single Exit, Data Encapsulation, Goto Statement, Recursion – Coding style – Standards and Guidelines – Walk through and inspections - Documentation guidelines.

**UNIT V**

**(11 Hrs)**

Software Testing Fundamentals: Introduction- Software Testing Perspective- Effective Software Testing – Types of Testing – Principles of Software Testing - Testing and Debugging. Black Box Testing: Introduction- Black Box Techniques – Equivalence Partitioning – Boundary Value Analysis. White Box Testing: Introduction- White Box Techniques – White Box Modeling- Basis Path Testing- Control Structure Testing

**Text Books**

1. Software Engineering – A Practitioner’s Approach, Roger S Pressman, McGraw Hill, 6th Edition, Fifth Reprint, 2012.
2. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill, 30<sup>th</sup> Reprint, 2008.
3. Software Testing Concepts and Practices – K.Mustafa and R.A. Khan, Narosa Publishing House Pvt. Ltd, Reprint 2009.

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**FIFTH SEMESTER**

**CORE: OPEN SOURCE SOFTWARE**

**Objective of the subject:** This paper focuses on open source systems. It also orients developing application with an open source scripting application like PHP in the front end and an open source backend like MySQL.

**UNIT I**

**(8 Hrs)**

Open Source – Definition of Terms – Open Source Operating systems – Contents – Linux distribution – Open Source Desktop applications – Introduction – Graphical Desktops – Web browsers – The Open Office Suite.

**UNIT II**

**(8 Hrs)**

MySql Data types – Working with Database and Tables: Creating, Selecting – Deleting Databases – Creating Tables – Copying Tables – Modifying Tables – Deleting Tables. Working with Data: Inserting, updating and deleting records – Retrieving records – Copying, Importing and Exporting records – Subqueries.

**UNIT III**

**(12 Hrs)**

PHP- Overview- Writing PHP Programs: Example program - Viewing a web page - Serverside scripting – caching – variables. Getting Data from the Client: Web forms - Decision making: Conditional or Branching statements - Form Validation - Loops and Arrays.

**UNIT IV**

**(10 Hrs)**

Organising codes: Code reuse – Functions - Scope of functions – Nesting - Include files. Objects : File and directory Handling: Working with files – Working with directories - uploading files.

**UNIT V**

**(12 Hrs)**

Retrieving data from MySQL using PHP: Retrieving data using PHP - SQL statements for Retrieving data. Manipulating Data in MySQL using PHP: Update - delete records - Date and Time Type fields - Getting information on database tables. PHP Database Connectivity: PHP MySQL Connectivity

**Text Books**

1. Paul Kavanagh, Open Source Software, Elsevier Digital Press, 2004, 1<sup>st</sup> Edition. (Unit I)
2. Vikram Vaswani, MySQL: The Complete Reference, Tata McGraw Hill, 2004. (Unit II)
3. Beginning PHP4, Wankyu Choi, Allan Kent, Chris Lea, Ganesh Prasad, Chris Ullman with Jon Blank, Sean Cazzell, Shroff Publishers and Distributors Pvt. Ltd, 2000. (Unit III, IV, V)

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**FIFTH SEMESTER**

**ELECTIVE-I**

**DATA WAREHOUSING AND MINING**

**Objective of the subject:** This paper focuses on architecture, approach and implementation of data warehousing. It also concentrates on KDD environment and general techniques for mining the data.

**UNIT I**

**(10 Hrs)**

Data Warehousing: Introduction – Definition – Multidimensional Data Model – Cubes and Dimensions – OLAP operations - Warehouse Schema – Data Warehousing Architecture – Warehouse Server - Meta data – Types – Data Warehouse Backend Process.

**UNIT II**

**(11 Hrs)**

Data Mining: Introduction – Data Mining Definitions – Knowledge Discovery in Database versus Data Mining – DBMS versus Data Mining – Research areas - Data Mining Techniques – Issues and Challenges – Application Areas.

**UNIT III**

**(10 Hrs)**

Association Rules: Definition – Methods to discover Association Rules – Apriori Algorithm – Partition Algorithm – Pincer Search Algorithm.  
Clustering Techniques: Paradigms – Partitioning Algorithms – K-Medoid Algorithms.

**UNIT IV**

**(11 Hrs)**

Decision Trees: Advantages and its weakness – Tree Construction Principle – Best Split – Construction Algorithms – Classification and Regression Tree – Iterative Dichotomizer – Rain forest – Approximate Methods.

**UNIT V**

**(8 Hrs)**

Web mining: Introduction – Purpose – Web content mining – Web structure mining – Web usage mining – Text mining – Unstructured text – Hierarchy of Categories – Text Clustering.

**Text Books**

1. Data Mining Techniques, Arun K Pujari, Universities Press (India) Private Limited, Second Edition, 2010.

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**Effective from the academic year: 2019 - 2020**

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**FIFTH SEMESTER**

**ELECTIVE-I**

**CLOUD COMPUTING**

**Objective of the subject:** The paper introduces about cloud computing and makes students familiar with the concept of Cloud Computing. This paper fulfills an important and growing need to understand the techno-economic view of cloud computing infrastructure, service offerings, cloud solutions and cloud management.

**UNIT I**

**(10 Hrs)**

First Drive: Introduction – Essentials – Benefits - Need for Cloud - Business and IT perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Characteristics - Cloud Adoption - Cloud Rudiments. Cloud Deployment Models: Characteristics - Measures Service - Cloud Deployment Models - Security in Public Cloud - Public versus Private Cloud - Cloud Infrastructure Self - Service.

**UNIT-II:**

**(10 Hrs)**

Cloud as a service: Gamut of Cloud Solutions - Principal Technologies - Strategy - Design and Implementation Using SOA - Conceptual Cloud - Cloud Service Defined. Cloud Solutions: Introduction - Eco system - Business Process Management - Service Management-On-Premise Orchestration and Provisioning Engine - Computing on Demand(CoD) - Cloud sourcing.

**UNIT-III**

**(10 Hrs)**

Cloud offerings: Information storage, Retrieval, Archive and Protection - Cloud Analytics-Testing Under cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Cloud Management: Introduction: Resiliency – Provisioning - Asset Management-Cloud Management - High availability and disaster recovery - Charging Models, Usage Reporting, Billing and Metering.

**UNIT-IV**

**(10 Hrs)**

Cloud virtualization technology - Virtualization defined - Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Infrastructure Requirements.

**UNIT-V**

**(10 Hrs)**

Cloud Infrastructure: Storage Virtualization - Storage Area Networks -Network Attached Storage - Cloud Server Virtualization - Networking Essential to Cloud.

**Text Book**

1. **Cloud Computing**, Dr.Kumar Saurabh, Wiley India, 2<sup>nd</sup> Edition, Reprint 2012.

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SIXTH SEMESTER

ELECTIVE-I

INFORMATION SECURITY

**Objective of the Subject:** This paper covers the concepts regarding security in Computing

**Unit I:** (10 Hrs)

Introduction to computer security: Basic concepts - threat models common security goals. Cryptography and cryptographic protocols - including encryption - authentication - message authentication codes - hash functions - one-way functions - public-key cryptography - secure channels - zero knowledge in practice - cryptographic protocols and their integration into distributed systems and other applications.

**Unit II:** (10 Hrs)

Operating system security: Memory protection - access control - authorization - authenticating users - enforcement of security - security evaluation - trusted devices - digital rights management.

**Unit III:** (10 Hrs)

Network Security: Firewalls - intrusion detection systems - viruses and worms - web security. Case studies: DNS, IPsec.

**Unit IV:** (10 Hrs)

Software Security: Secure software engineering - defensive programming - buffer overruns and other implementation flaws.

**Unit V:** (10 Hrs)

Case Studies: Privacy - mobile code - digital rights management and copy protection - trusted devices - denial of service and availability - network based attacks - security and the law - electronic voting.

**Reference Book**

1. Charles P Pfleeger and Shari Lawrence Pfleeger, Security in computing, Fourth Edition, Prentice Hall, 2007.
2. Ross J. Anderson and Ross Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems, Wiley, 2001.
3. Debby Russell and Sr. G.T. Gangemi, Computer Security Basics(Paperback), 2<sup>nd</sup> edition, O'Reilly Media, 2006.
4. Thomas R. Peltier and John Blackley, Information Security Fundamentals, 2<sup>nd</sup> Edition, Prentice Hall, 1996.

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*BLLI-27*

**Effective from the academic year: 2019 - 2020**

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**SIXTH SEMESTER**

**ELECTIVE-I**

**AIR AND SEA NAVIGATION**

**Objective of the Subject:** This course is designed to introduce the computing technologies used for Air and Sea Navigation. The fundamentals, key terms and equipments used for the navigations purposes are discussed.

**UNIT I:** (10 Hrs)

Air Navigation: Navigation Aids – Distance Measuring Equipments (DME) – LORAN - Doppler RADAR – GPS. Aeronautical lighting and other Airport Visual Aids: Approach Light Systems – Runway Edge Light Systems – Control of Lighting Systems - Air Space: General Dimensions of Airspace Segments – Transient Speed Control-Descent gradient - Wind Direction. Air Traffic Control: Air Route Traffic Control Centers – Control Towers.

**UNIT II:** (10 Hrs)

Emergency Procedures: Pilot Responsibility and Authority -Emergency Conditions – Distress Signals – Safety of the Flight: Weather Observing Program – Medical Facts for Pilots: Fitness for flight – Vision in flight –Dynamics of the Helicopter - Helicopter Operations: Helicopter Flight control systems.

**UNIT III:** (10 Hrs)

Fundamentals: Introduction to Marine Navigation – Nautical Charts: Chart fundamentals – Piloting: Definition and Purpose - Preparation – Transition to Piloting - Short Range aids to Navigation: Fixed Lights – Light Characteristics – Buoyage Systems – Compasses – Magnetics Compasses - Tides and Tidal Currents: Origins of Tides – Features of Tides

**UNIT IV:** (10 Hrs)

Emergency Navigations: Basic Techniques -Navigation Regulations: Ship Routing – Avoiding rock collisions - Maritime Safety Systems - Global Maritime Distress and Safety System - Distress Signals. Hydrography: Basics of Hydrographic Surveying. Weather Elements: General Description of the Atmosphere.

**UNIT V:** (10 Hrs)

Satellite Navigation: The Global Position System – LORAN Navigation: Introduction to LORAN – LORAN Description – RADAR Navigation: Principles of RADAR operations. Navigational Astronomy: The Universe – AZIMUTHS and AMPLITUDES

**Text Books**

1. Nathaniel Bowditch, LL.D, The American Practical Navigator : The Epitome of Navigation, The National Imagery and Mapping Agency, 2002.
2. Jim Doherty, Maritime Navigation, Trieste, Italy, 2010(Online Tutorial)
3. Professor Dr. Paul Stephen Dempsey, Director, Institute of Air & Space, Air Navigation, McGill University, [www.iasl.mcgill.ca](http://www.iasl.mcgill.ca) (online Tutorial)
4. Aeronautical Information Manual, Official Guide to Basic Flight Information and ATC Procedures, US Department of Transportation, Federal Aviation Administration, 2017.

Subject code:

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**FIFTH SEMESTER**

**CORE: PYTHON PROGRAMMING LAB**

**Objective of the Subject:** The course provides hands-on experience to develop simple applications Python Programming.

1. Expressions
2. Operators
3. Looping
4. Branching
5. Arrays
6. String functions
7. Functions
8. Lists
9. Tuples
10. File Handling

**Note:**

Develop a project / case study using the above applicable concepts.

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**Effective from the academic year: 2019 - 2020**

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**FIFTH SEMESTER**

**SKILL BASED SUBJECT: APTITUDE**

**Objective of the subject:** This subject highlights on improving the aptitude ability of the student and to understand technical and logical work outs like ratio and proportion, Profit and Loss, Probability, C Programming and OOPS concepts.

**UNIT I**

**(6 Hrs)**

Operation on numbers: Introduction -Face value -Place value - BODMAS rule. Ratio and Proportion: Ratio -Proportion- Indices - Logarithms - Average - Simple Problems.

**UNIT II**

**(6 Hrs)**

Problems on Ages: Problems on Ages - Clocks and Calendars - Mixtures and Alligations - Time and Work - Time and Distance. Profit and loss: Introduction - Cost price - Selling price - Profit and loss - Simple Problems.

**UNIT III**

**(6 Hrs)**

Statistical description of data: Textual - Tabular and Diagrammatic representation of data - Data Sufficiency - Probability: Concept of percentage - Probability - Simple Problems.

**UNIT IV**

**(6 Hrs)**

Problem Solving techniques in C - Data types - Type casting - Bitwise Operators - Arithmetic expressions, Relational Operators - Logical Expressions - Functions and Parameter Passing by Value - Passing Arrays to Functions, Call by value - Call by Reference - Recursion - Structures and Pointers.

Object Oriented C++ - Classes - Objects - Object oriented Paradigms: Data Abstraction - Encapsulation - Inheritance - Polymorphism - Abstract Classes - Virtual classes

**UNIT V**

**(6 Hrs)**

Java: Language Fundamentals, Operators and Assignments, Exceptions, Inner Classes, Garbage Collections, Java Packages, Inheritance, Interfaces, Java.util class, Java.io class, Threads.

Python: variables, expressions, math function, Function calls, Type conversion functions, Parameters and arguments, Debugging, Conditionals and recursion, Lists, Dictionaries, Strings, Tuples, files, Classes and Objects

**Text Books**

1. R.S.Aggarwal, **Quantitative Aptitude**, S. Chand, 20th edition, 2013.
2. Ashish Aggarwal, **Quick Arithmetic**, S. Chand & Company Ltd, 2007.
3. S.Anadhamurugan, **C Programs with Solutions**, University Science Press, First Edition, 2011.
4. Kanetkar, Yashavant P, **Let us C++**, BPB Publications, 2010.
5. Herbert Schildt, **The Java Complete Reference**, Tata McGrawHill, Publishers, 7<sup>th</sup> Edition, 2007.
6. Allen Downey, **Think Python**, 2<sup>nd</sup> Edition, Green Tea Press, Massachusetts, 2012.

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**Effective from the academic year: 2019 - 2020**

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**SIXTH SEMESTER**

**CORE: CYBER SECURITY**

**Objective of the subject:** This paper helps the students to understand the different types of Threats, Cyber Crimes, Cyber Risks and also discusses on the necessity of Threat Intelligence for a better Cyber Management and supportive Architecture.

**UNIT I**

**(10 Hrs)**

**Cyber Threats:** Cyber Security and its importance-Cyber Threats -Organized Crime - Proliferation of Weapons of Mass Destruction- Background, Sources and Types of Cyber Threats- Potential Risk factors of Cyber Threats- **Cyber Crime:** Overview-Origin and evolution of Cyber Crime-Criminalization-Cyber Crime Classifications-Conducting Cyber Investigations-Economical crisis - Challenges faced in Cyber Crimes.

**UNIT II**

**(8 Hrs)**

**Cyber Threat Intelligence-** An Overview of Threat Intelligence- Key Characteristics-Need for Threat Intelligence- Impact of Threat Intelligence-Applicability of Threat Intelligence. Threat Detection Rules -Risk Reduction through Threat Intelligence - Understanding and Implementing Threat Intelligence.

**UNIT III**

**(11 Hrs)**

**Cyber Management** -Cyber Risk- Analyzing and Managing Cyber Risks- Risk Management Principles: Principles of Risk Management-Risk Management Process-Dealing with Risks- Risk Analysis - Evaluating cyber risks: Assessing the IT security-Quantifying the Risks-Evaluation of the existing Insurance Policies-Improve security and overall Risk Strategy- **Prepare your organization- Coverage Review-** Benefits of Risk Management- Cyber Risk Management Frameworks-Governance of Cyber Security Risks.

**UNIT IV**

**(11 Hrs)**

**Cyber Security Challenges** – Fundamentals – Evolution - Strategic Cyber Security-Preventing Cyber Attacks - Methods of Securing Next Generation Internet Services. **Cyber Security Architecture** - Planning, Design and Implementation Issues of Security Architecture - Implementation Issues of the Security Architecture - Global Architectural Approach - Multifaceted Cyber Security.

**UNIT V**

**(10 Hrs)**

**Cyber Defense Mechanisms-** Cyber Self Defense- Cyber Attack Techniques and Defense Mechanisms- Cyber Defense Planning Model- Cyber Supply Chain Security- DDOS Attacks and Cyber Defense: Securing Industrial Control Systems - Case Studies on Cyber Crime in Indian Perspective.

**Text Book**

1. Combating Cyber Threats through Cyber Security Intelligence, Dr.S.Sujatha, Dr.N.Sudha Bhuvaneshwari, Kalaikathir Publications, 2017.

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**SIXTH SEMESTER**

**CORE: MOBILE APPLICATION DEVELOPMENT**

**Objective:** This course highlights the architecture of Android, its requirements, building android application with good user interface, data store and messaging capabilities. It also gives an insight on Android security Architecture and the security concerns to be considered while developing the secured Android Applications and also how to publish an Android application.

**UNIT I**

**(10 Hrs)**

Introduction to Android – Required Tools – Creating your first Android Application – Anatomy of Android Application. Activities, Fragments, and Intents: Understanding Activities – Linking Activities using Intents – Fragments.

Introduction to IOS : The New UI- Custom Transitions- New Multitasking modes- LLVM5- Xcode5. Animations: Animations- UIMotionEvent- Tint Colors- Custom Transitions.

**UNIT II**

**(10 Hrs)**

Android User Interface: Understanding the components of a Screen – Adapting to Display Orientation – Managing Changes to Screen Orientation. Designing Your User Interface with Views: Using Basic Views – Using List views to Display Long lists – Using Menus with Views

**UNIT III**

**(10 Hrs)**

Data Persistence: Saving and Loading User Preferences – Persisting Data to Files – Creating and Using Databases. Content Providers: Sharing Data in Android – Using a Content Provider – Creating a Content Provider – Using the Content Provider.

**UNIT IV**

**(10 Hrs)**

Messaging: SMS Messaging – Sending E-mail. Developing Android Service: Creating Services – Establishing Communication between a Service and an Activity – Binding Activity to Services. Publishing Android Applications: Preparing for Publishing – Deploying APK files.

**UNIT V**

**(10 Hrs)**

Android Security Architecture: Understanding Permission Architecture – Checking Permissions – Using Self Defined Permissions – Protection levels. Data Storage and Security: Data storage in Android – Shared Preferences – Combining Data storage with Encryption. Talking to Web Applications: OWASP and Web Attacks – Authentication Techniques – Self-signed Certificates – Man-in-the-Middle Attack – OAuth – Challenge/Response with Cryptography.

Subject code:

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**Text Books**

1. Beginning Android 4 Application Development, Wei-Meng Lee, John Wiley & Sons Inc., 2012.
2. Android Apps Security, Sheran A. Gunasekara, APress, 2012.
3. iOS7 Programming, Develop Advanced Applications for Apple Iphone ,iPad, and iPOD Touch, Authorized reprint by Wiley India Pvt Ltd, 2014, New Delhi.

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**B.Sc (Information Technology)**

*BFFF-33*

**Effective from the academic year: 2019 - 2020**

*2019-20*

**SIXTH SEMESTER**

**ELECTIVE-II**

**WIRELESS APPLICATION PROTOCOL**

**Objective of the subject:** This paper concentrates on WAP, WML, PUSH technologies and Mobile Internet.

**UNIT I**

**(10 Hrs)**

Overview of WAP: WAP Origins - Overview of the WAP Architecture - Components of the WAP Standard - Network Infrastructure Services Supporting WAP Clients - WAP Architecture Design Principles - Relationship to Other Standards.

**UNIT II**

**(10 Hrs)**

Basic WML: Overview - The WML Document Model - WML Authoring - URLs Identify Content - Markup Basics - WML Basics - Basic Content - Events, Tasks and Bindings - Variables.

**UNIT III**

**(10 Hrs)**

Controls - Miscellaneous Markup - Sending Information - Application Security - Other Data: The Meta Element - Document Type Declarations - Errors and Browser Limitations - Content Generation - WML Version Negotiation.

**UNIT IV**

**(12 Hrs)**

PUSH Technologies: Overview of PUSH - Push Access Protocol - WAP PUSH addressing - PUSH message and types - PUSH Proxy Gateway - Push over the Air Protocol - Authentication and Trusted content. Wireless Telephony Applications: WTA Architecture - Client Framework - Server and Security - Design - Creation Toolbox - Future Enhancement.

**UNIT V**

**(8 Hrs)**

Mobile Internet Future: Better content, Easier access - Beyond Browsing - Beyond Cellular - Mobile Data Unleashed.

**Text Book**

1. Wireless Application Protocol, Sandeep Singhal, Thomas Bridgman, Lalitha Surianarayana, Daniel Mauney, Pearson Education, Fifth Impression, 2009.

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**Effective from the academic year: 2019 - 2020**

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**SIXTH SEMESTER**

**ELECTIVE-II**

**INTEGRATING SOA AND WEB SERVICES**

**Objective of the subject:** The objective of the course is to highlight on Integration and realization of Service Oriented Architecture with Web Services. The syllabus also focuses on topics like SOA Governance, Business Process Management, Integration of SOA and Web Services.

**UNIT I**

**(10 Hrs)**

Introduction to SOA and Web Services: Evolution of SOA Web Services Service -Oriented Enterprise-Service Oriented Architecture-Understanding Web Services-Integrating Web Services with SOA. The Service Architecture: SOA services-Service Lifecycle-SOA Models-Principles of SOA-SOA Mapping Components

**UNIT II**

**(10 Hrs)**

SOA Governance: Overview - Organization – Policies - Analysis Process-Governing Run-Time Behavior.

**UNIT III**

**(10 Hrs)**

SOA and Business Process Management: Business Process Management Concepts-Role of Business Process Management in SOA-Working with Dynamic BPM and SOA environment-Coordinating BPM, SOA and Web Services.

**UNIT IV**

**(10 Hrs)**

Web Service Architecture & its Specifications: Application Components-Elements of Web Services-Web Service Models-REST Architecture. Web Service Protocols and Technologies: XML-SOAP-WSDL-UDDI-ebXML

**UNIT V**

**(10 Hrs)**

Integrating SOA and Web Services: Overview of Integration - Design and development of SOA for integration - The role of XML and Web Services in SOA for integration - Building integration and interoperability using XML and Web Services - J2EE and .NET interoperability.

**Text Book**

1. N.Sudha Bhuvaneshwari and S.Sujatha, Integrating SOA and Web Services, River Publishers Series in Information Science and Technology, Denmark, 2011.

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**FIFTH SEMESTER**

**ELECTIVE-II**

**ARTIFICIAL INTELLIGENCE**

**Objective of the subject:** This subject helps in understanding the concepts and mechanisms of Artificial Intelligence which includes details about Search process and Knowledge Representation

**UNIT I**

**(8 Hrs)**

Introduction to AI - The Foundations - History of Artificial Intelligence - The State of the Art.

**UNIT II**

**(10 Hrs)**

Agents and Environments - Good Behavior: The Concept of Rationality - The Nature of Environments - The Structure of Agents.

**UNIT III**

**(10 Hrs)**

Problem-Solving: Problem-Solving Agents - Example Problems: Toy Problem- Searching for Solutions - Uninformed Search Strategies: Breadth-first, Depth-first, Depth-limited, Iterative deepening depth-first search - Avoiding Repeated States - Searching with Partial Information

**UNIT IV**

**(12 Hrs)**

Informed Search and Exploration: Informed (Heuristic) Search Strategies - Heuristic Functions - Local Search Algorithms and Optimization Problems - Local Search in Continuous Spaces – Practical applications of AI (Games, CAD/CAM).

**UNIT V**

**(10 Hrs)**

Machine learning: Datasets: Introduction-Olive oil dataset (Hierarchical) - Ischemia heart disease classification - Australian crabs- (Hierarchical) – Optdigits - IRIS datasets - Pageblock.

**Text Book**

1. Artificial Intelligence - A Modern Approach, Stuart Russell, Peter Norvig, Pearson Education Ltd, 3<sup>rd</sup> Edition, 2014.
2. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B Nair, fourth reprint, 2010.
3. Machine Learning with SVM and other Kernel Methods, K.P.Soman, R.Loganathan, V.Ajay PHI learning private Limited, 2009.(Unit-V)

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**FIFTH SEMESTER**

**ELECTIVE-II**

**EMBEDDED SYSTEM AND ITS APPLICATIONS**

**Objective of the subject:** The objective of the course is to introduce the basic components of embedded systems and robotics. This course also introduces some of the Applications of sensors and Robots.

**UNIT I**

**(10 Hrs)**

Basic Electronics: Components and Devices: Capacitors – Resistors – Transistors – Diodes – LEDs - Breadboard – AC Motors – DC Motors - Servo Motors - Measuring Instruments – Circuits – Power Units

**UNIT II**

**(10 Hrs)**

Introduction to Microcontrollers and Embedded Systems: Introduction to PCB – Microprocessors Vs. Microcontrollers – Types of Microcontrollers, Advanced Microcontroller Chips: ATmega, Atmel - Arduino IDE

**UNIT III**

**(10 Hrs)**

Fundamentals of Sensors – Types - functional characteristics of sensors – IR Sensors – Temperature Sensors – Light Sensors - Actuators – Sensors and actuators for Biosciences – Tactile Sensors. Application: Domain Specific IoTs: Introduction- Home Automation, Cities, Retail, Logistics and Agriculture.

**UNIT IV**

**(10 Hrs)**

Introduction to Robots – Types of Robots – Operating Principles and functions – Black Line follower robot – Edge detector robot – Obstacle sensing – Automation of Traffic signals.

**UNIT V**

**(10 Hrs)**

Applications: Robotics applications in Agriculture, Biotechnology, Information and Communication Technology, Navigation.

**Reference Books**

1. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, Pearson edition, 2011.
2. David E. Simon, An Embedded Software Primer, Pearson Education, First Edition, 2002.
3. Arshdeep Bahga and Vijay Madisetti, Internet of Things: A Hands-on Approach, Universities press(India) private Limited, Reprinted 2016.

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**B.Sc (Information Technology)**

*B.T.P.P - 87*

**Effective from the academic year: 2019 - 2020**

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**SIXTH SEMESTER**

**CORE: MOBILE APPLICATION DEVELOPMENT LAB**

**OBJECTIVE OF THE SUBJECT:** To develop user interfaces, activities and views in the Android operating system. It also highlights the location identification, sms and e-mail.

The following programs can be implemented in ANDROID Operating System.

1. Activities.
2. Intent Filters.
3. User Interface.
4. Image Views.
5. Create a database to store the values.
6. Store the data in SD Card.
7. Content Providers.
8. SMS Messaging.



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**SIXTH SEMESTER**

**SKILL BASED SUBJECT: SOFT SKILLS**

**Objective of the subject:** This course content guides and helps students to concentrate on career planning, group discussion, art of listening skill, art of speaking skill, body language, team building and team work, etiquette, manners, CV writing, interview skills, and dress code.

**UNIT I**

**(6 Hrs)**

Soft skills: Introduction – Importance of Soft Skills – Attributes Regarded as Soft Skills – Practicing Soft Skills – Know Thyself / Self Discovery: Importance of Knowing Yourself – Process of Knowing Yourself – Developing Positive Attitude .

**UNIT II**

**(6 Hrs)**

Forming Values: Meaning – Value - Values Relating to Education – Values Relating to Self and Others- Important of Values – Types of Values: Terminal and Instrumental values, Power of Values – Examples for Values. Career Planning: Guidelines for Choosing a Career – Myths about Choosing a Career – Tips for Successful Career Planning.

**UNIT III**

**(6 Hrs)**

Art of Listening: Listening – Benefits of Active Listening – Kinds of Listening – Art of Reading: Benefits of Reading – Different Types of Reading – The SQ3R Technique – Art of Speaking: Defining Communication – Special Features of Communication – Importance of Communication – Tips for Effective Communication.

**UNIT IV**

**(6 Hrs)**

Body Language: Forms of Body Language – Parts of Body Language – Types of Body Language - Team Building and Teamwork: Aspects of Team Building – Skills Needed for Teamwork – A Model of Team Building - Team Vs Group - Characteristics of Effective Team – Role of a Team Leader – Role of Team Members - Group Discussion(GD): Meaning of GD – Skills Required in a GD – Essential Elements of GD.

**UNIT V**

**( 6 Hrs)**

Etiquette and Manners: Introduction – Classification of Etiquette – Manners: Introduction – Good Manners - Preparing CV/Resume: Meaning – Types of Resumes – CV Writing Tips – Interview Skills: Types of Interview – Types of Questions Asked – Dress Code at Interview.

**Text Book**

1. Dr. K. Alex, **Soft Skills Know yourself & Know the world**, S.Chand & Company Ltd, 2009.