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THE NATIONAL COLLEGE

(Autonomous)

Jayanagar, Bangalore

Affiliated to Bangalore University

Department of Computer Science

REGULATIONS, SCHEME AND SYLLABUS

I to VI Semesters

BACHELOR OF COMPUTER APPLICATIONS
(BCA)

2020-2021

(Choice Based Credit System)

Program Outcomes:

PO1: To work effectively both as an individual and a team leader on multi-disciplinary projects.

PO2: Inculcates the ability to analyze, identify, formulate and develop computer applications using modern computing tools and techniques.

PO3: Prepares to create design innovative methodologies for solving complex-real life problems for the betterment of the society.

PO4: To integrate ethics and values in designing computer application.

Regulations Pertaining to Bachelor of Computer Applications (B.C.A)

1. Eligibility: Students who have completed two years Pre-University (10+2) course of Karnataka or equivalent examination are eligible to apply for admission to BCA Degree Programme.
2. Duration of the Course: Three academic year consisting of six semesters.
3. Medium of Instruction: The medium of instruction and examination shall be in English.
4. Evaluation Procedure for courses with practical's:
 - a. Continuous Internal Assessment for Theory (CIA): 30 Marks

Two Test average marks	20
Assignment	5
Attendance	5
Total	30

- b. End Semester Examination for theory (ESE): 70 Marks
 - c. Continuous Internal Assessment for Practical (CIA): 15 Marks

One Test	10
Attendance	5
Total	15

- d. End Semester Examination for Practical (ESE): 35 Marks

- e. Students should secure a paper minimum of 40% each in end semester theory and in theory total (CIA + ESE), end semester practical examination and in practical total (CIA + ESE)

5. Evaluation Procedure for core Project

IV Semester Project I:

- a) Continuous Internal Assessment (CIA): 35 Marks

Demonstration of Project	25
Report	5
Viva	5
Total	35

- b) End Semester Examination (70 marks)
c) Students should secure a paper minimum of 40% in the End Semester Examination.

V Semester Project II:

- a) Continuous Internal Assessment (CIA): 35 Marks

Demonstration of Project	25
Report	5
Viva	5
Total	35

- b) End Semester Examination (70 marks)
c) Students should secure a paper minimum of 40% in the End Semester Examination

VI Semester Project III:

- a) Continuous Internal Assessment (CIA): 70 Marks

Demonstration of Project	60
Report	5
Viva	5
Total	70

- b) End Semester Examination(100 marks)
c) Students should secure a paper minimum of 40% in the End Semester Examination

THE NATIONAL COLLEGE, JAYANAGAR

BANGALORE-70

Department of Computer Science

Bachelor of Computer Application Course Matrix

2020-2021

I Semester								
	Paper		Hours/Week	Marks			Credit	Total Credits
	Code	Title		IA	Exam	Total		
Part-1	1BLENGT	English	4	30	70	100	2	24
		Kan/San/Hin	4	30	70	100	2	
Part-2	1BCAMAT	DISCRETEMATHEMATICS	4	30	70	100	4	
	1BCORGT	Computer Organization	4	30	70	100	4	
	1BCPRGT	Programming using C	4	30	70	100	4	
	1BIWTGT	Introduction to Web Technologies	4	30	70	100	4	
	1BCPRGP	Programming in C- Lab	3	15	35	50	1	
	1BIWTGP	Web Technologies- Lab	3	15	35	50	1	
Part-3		Value Education	1	15	35	50	1	
		Mandatory Course	2	15	35	50	1	
Total Marks and Credits			33	240	560	800	24	

1BCAMAT: DISCRETE MATHEMATICS

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit :4
Course Objective:	
<ul style="list-style-type: none"> • Learn the practical problems and show it in venn diagrams. • Learn to do Cartesian product and form different Relations from the Cartesian product. • Expansion of two terms with 'nth power using Binomial Theorem. • Implement the Logics, truth tables, logical equivalence • Solving the given equations and finding the unknowns using matrix methods 	
Course Outcome:	
<ul style="list-style-type: none"> • The students are introduced to the concepts of Set Theory, Relations and Functions , topics on Permutations and combinations, Binomial Theorem. • The paper also provides concepts on Fundamentals of Mathematical Logic. • The Matrices topic is introduced with subtopics Inverse of a matrix and Cayley Hamilton Theorem. 	
UNIT 1: SET THEORY	Teaching Hours :08
The student learns to express the whole given data in the form of Venn Diagram. Different types of Sets , Union and Intersection ,Difference of two sets and finding the number of elements in a set is known.	
UNIT 2: RELATIONS AND FUNCTIONS	Teaching Hours :12
By learning the cartesian product the candidate can learn how to form different relations and for the given Relation how to find the ordered pairs	
UNIT 3: FUNDAMENTAL PRINCIPLES OF COUNTING	Teaching Hours 07
Arrangement of objects and selection of things can be known, expansion of two terms is learnt very easily by using Binomial theorem. Expansion of two terms with nth power or more also can be expanded.	
UNIT 4: FUNDAMENTALS OF LOGIC	Teaching Hours :15
Truth tables of conjunction and Disjunction are known which is used in circuits, logical implication, use of Quantifiers is known.	
UNIT 5: MATRICES	Teaching Hours :10
Large amount of data can be arranged in matrix form can be learnt. To find the unknowns in equations can be solved through matrix method. Simultaneous linear equations can be solved in less duration.	
<i>Essential Text Book:</i>	
<ol style="list-style-type: none"> 1. Ralph.P.Grimaldi, Discrete and combinatorial Mathematics, An applied introduction, Pearson Education (LPE) Fourth edition, sixth Indian Reprint, 2004.. 2. Kolman, Busby and Ross, Discrete Mathematical, 5/e, Pearson Education 2003. 3. Mali, DS and SEN, M.K., Discrete Mathematical Structures (Theory and Applications) 	

Thomas Pub.2006.

4. Srimani P.K. Discrete Mathematical Structures, Cambridge University. Press.2006.

Reference Text Books:

1. Garry Haggard, John Schlips, SUE Whiterides, Discrete Mathematics for Computer Science, Thompson Pub. 2006
2. Thomas Koshy, Discrete Mathematical Structures, Elseiver, 2006.
3. Richard Johnsonbaugh, Discrete Mathematics, Fifth edition, Pearson Education (LPE) 2003.
4. Rajendra Akerkar and Rupali Akerkar, Discrete Mathematics, Pearson Education, 2004
5. C.L.Liu, Elements of Discrete Mathematics, McGraw Hill, 1985.

1BCORGT: COMPUTER ORGANIZATION

Total Teaching Hours : 52	No. Of Lecture Hours/Week: 4
Max Marks:70	Credit : 4
Course Objective:	
<ul style="list-style-type: none">● To conceptualize the basics of organizational and architectural design of a digital computer.● Be familiar with the history and development of modern computers. Be familiar with Number system and Boolean Algebra.● Be familiar with Combinational and logic circuits. Be familiar with organization and design of modern computers and its architecture.	
Course Outcome:	
Upon successful completion of the course the student will be able to:	
<ul style="list-style-type: none">● To use math and Boolean algebra in performing computations in various number systems● Understand the basic components of a computer, including CPU, memories, and input/output, and their organization.● Ability to design efficient combinational and sequential logic circuit implementations from functional description of digital systems.	
UNIT 1-BASIC STRUCTURES OF COMPUTERS	Teaching Hours :10
Computer Types, Functional Units: Input unit, Memory unit, Arithmetic and Logic Unit, Output, Control unit, Basic operational concepts, Bus structures,Software, Performance, basic performance equation, Clock rate, Instruction set: CISC,RISC Compiler ,Performance measurement.	
UNIT 2-MACHINE INSTRUCTIONS AND PROGRAMS	Teaching Hours :10
Numbers, Arithmetic operations,Number representation, Memory location and addresses, Memory operations, Instruction and Instruction sequencing,Addressing modes, Assembly language,Assembler directives, Assembly and execution of programs, Basic Input-Output operations	

UNIT 3-BASIC PROCESSING UNIT	Teaching Hours :10
Fundamental concepts, Register transfers, performing an arithmetic or logic operation, Fetching a word from memory, Storing a word in the memory, Execution of a complete Instruction, Branch instructions, Multiple bus organization Hardwired control (Basic block diagram),A complete processor.	
UNIT 4-INPUT OUTPUT ORGANIZATION	Teaching Hours :12
Accessing I/O devices,Interrupts, Interrupts hardware, Enabling and disabling interrupts, Handling multiple devices, Exceptions, Direct memory access, Bus arbitration, Buses, Synchronous bus, Asynchronous bus, Interface circuits serial port, parallel port, Standard I/O interfaces, Peripheral component interconnect ,Universal serial bus.	
UNIT 5-THE MEMORY SYSTEM	Teaching Hours :10
Basic concepts, Semiconductor RAM Memories, Internal Organization of memory chips, Static memories, DRAMs, Structure of largememories,Memory stream consideration, Ram bus Memory,Read only memories, ROM, PROM,EEPROM, EPPROM, Flash memory, Speed, Size, cost,Cache memories.	
Text Books:	
<ol style="list-style-type: none"> 1. Computer Organization by Horowitz Carl Hamacher, Zvonko Vranesic, Safwat Zaky TATA McGraw Hill 5th Edition. 	
Reference Text Books:	
<ol style="list-style-type: none"> 1. Computer Organization and Architecture: Eighth edition Pearson. 2. Computer architecture and organization,P Chakraborty, JAICO publishers. 3. Computer System Architecture M Morris Mano 2nd edition, Prentice Hall of India 	

1BCPRGT: PROGRAMMING USING C

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit :4
Course Objective:	
<ul style="list-style-type: none">• To study about algorithms, flowcharts and programs. To solve problems through logical thinking.• To clearly understand the logic of the problem. To analyze the given problem and write the algorithm, flowchart.• To write structured C programs using control statements.• Demonstrate concepts like arrays, strings and structures.• Demonstrate to handling files.	
Course Outcome:	
Upon successful completion of the course the student will be able to:	
<ul style="list-style-type: none">• To clearly understand the logic of the problem.• To analyze the given problem and write the algorithm and flowchart• To write structured C programs, this is the foundation of any programming language.	
UNIT 1 -INTRODUCTION	Teaching Hours :10
Introduction to Programming Concepts: Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts with examples. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.	
UNIT 2- Managing Input and Output Operation:	Teaching Hours :10
Formatted and Unformatted I/O Functions, Decision making, branching and looping: Decision Making Statements - if Statement, if- else statement, nesting of if-else statements, else-if ladder, switch statement, conditional operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements. Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.	
UNIT 3 -ARRAYS	Teaching Hours :10
Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.	

UNIT 4 -STRUCTURES	Teaching Hours :12
<p>Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions.</p>	
UNIT 5 -FILES	Teaching Hours :10
<p>File modes, File functions, and File operations, Text and Binary files, Command Line arguments. C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.</p>	
Text Books:	
<ol style="list-style-type: none"> 1. E. Balaguruswamy, “Programming In ANSI C”, 4thedition, TMH Publications, 2008 2. Ashok N. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 2006. 3. Yashwant Kanetkar, “Let Us C”, 17thEdition, PHP, 2020. 	
Reference Text Books:	
<ol style="list-style-type: none"> 1. The C Programming Language, Brain W. Kernighan, Dennis M. Ritchie, 2nd Edition, Pearson 2015 	

1BIWTGT: INTRODUCTION TO WEB TECHNOLOGY

Total Teaching Hours: 52

No. Of Lecture
Hours/Week:4

Max Marks:70

Credit :4

Course Objective:

- Introductory course exploring the fundamentals of Internet communications with an emphasis on the World Wide Web.
- Students develop an understanding of the Internet's underlying technologies and learn how to utilize them as contributing members of the Web community.
- Students become proficient with creating and publishing Web pages using HTML and CSS. No prior knowledge or experience is assumed.

Course Outcome:

Upon successful completion of the course the student will be able to:

- Describe the technologies that form the basis of the Internet and, in particular, the World Wide Web.
- Analyze a web page and identify its elements and attributes.
- Create a web page using HTML and cascading style sheets.

UNIT 1:Basics of Internet

Teaching Hours :06

Brief History of Internet, World Wide Web,URL, Web Browser, IP address, Domain name, Internet service providers, Internet Security, web search engine, Client server technology

UNIT 2:Web Design Principles

Teaching Hours :10

Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar , Page design , Home Page Layout Design Concept.

UNIT 3:Introduction to HTML

Teaching Hours :10

What is HTML, HTML Documents, Basic structure of an HTML document Creating an HTML document, Mark up Tags,Heading-Paragraphs, Line Breaks HTML Tags.

UNIT 4:Elements of HTML

Teaching Hours :12

Introduction to elements of HTML, Working with Text , Working with Lists, Tables and Frames , Working with Hyperlinks, Images and Multimedia ,Working with Forms and controls.

UNIT 5:Introduction to Cascading Style Sheets**Teaching Hours :14**

Concept of CSS, Creating Style Sheet, CSS Properties,CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects ,Working with Lists and Tables , CSS Id and Class , Box Model(Introduction, Border properties, Padding Properties, Margin properties) , CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs.

Essential Text Books:

1. Web design with HTML and CSS, Jeremy Osborn, Jennifer Smith, Wiley Publishing.
2. The Complete Reference, HTML and CSS , Thomas A powell

Reference Text Books:

1. Deitel, Deitel, Goldberg, "Internet and World Wide Web How to Program", Third Edition, Pearson Education.
2. Raj Kamal,"Internet And Web Technologies",Tata McGraw-Hill.
3. HTML BLACK BOOK, Steven Holzner, Dreamtech Press.

2nd Sem B.C.A

II Semester								
	Paper		Hours/Week	Marks			Credit	Total Credit
	Code	Title		IA	Exam	Total		
Part-1	2BLENGT	English	4	30	70	100	2	25
		Kan/San/Hin	4	30	70	100	2	
Part-2	2BCAMAT	STATISTICAL MATHEMATICS	4	30	70	100	4	
	2BDASTT	Data Structures using C	4	30	70	100	4	
	2BJAVAT	OBJECT ORIENTED PROGRAMMING USING JAVA	4	30	70	100	4	
	2BOPSYT	Operating System	4	30	70	100	4	
	2BDASTP	Data Structures using C- Lab	3	15	35	50	1	
	2BJAVAP	Java -Lab	3	15	35	50	1	
Part-3		Value Education	2	15	35	50	2	
		Mandatory Course	2	15	35	50	1	
Total Marks and Credits			34	240	560	800	25	

2BCAMAT: STATISTICAL MATHEMATICS

Total Teaching Hours :52

No. Of Lecture
Hours/Week: 04

Max Marks: 70

Credits : 4

Course Objective:

- Learn to locate the roots of $f(x) = 0$ by Bisection and Newtons methods and convergence analysis.
- Learns the existence of Polynomial Interpolation and to find Error in Polynomial interpolation.
- Learns to Evaluate Integration without using integration formulae.
- Solving the system of linear equations by iterative methods .
- Statistical methods and applications of Probability are learnt.

Course Outcome:

- The students are introduced to the concepts of Numerical Methods such as Interpolation methods, Iterative methods, Elimination methods.
- The paper also provides to solve system of linear equations, Ordinary Differential Equations, IVP and BVP..
- Basic concepts of finding the Mean , Median ,Mode, Probability axioms based on set theory concepts.

UNIT 1: ROOTS OF EQUATIONS

Teaching Hours :08

Different methods such as Bisection methods and Newtons method are learnt to solve the system of non-linear equations. Along with this convergence analysis, failure of Newtons method due to bad starting points, Modification of Newtons method for multiple roots.

UNIT 2: INTERPOLATION AND NUMERICAL DIFFERENTIATION

Teaching Hours :08

Through Interpolations the missing data can be found accurately with the given data and from Extrapolation the successive data or outside the given range is analysed.

UNIT 3: NUMERICAL INTEGRATION

Teaching Hours 06

Integration problems are solved without using integration formulae. Problems are solved using three methods. Trapezoidal rule, simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule.

UNIT 4: SYSTEM OF LINEAR EQUATIONS

Teaching Hours :08

Linear equations are solved by Iterative methods where the unknowns can be found accurately.

UNIT 5: ORDINARY DIFFERENTIAL EQUATIONS	Teaching Hours :08
B.V.P are solved for linear differential equations. The values which are asked can be solved using the given initial values by applying few iterative methods.	
UNIT 6: STATISTICAL METHODS	Teaching Hours :08
Mean , Median , Mode, rank, skewness, Karl Pearson correlation methods are used in this chapter.	
UNIT 7: PROBABILITY	Teaching Hours :06
Laws of Probability, Bayes theorem, applications of probability are learnt.	
Text Book	
1. Chenay E.W and Kincaid D.R. “Numerical Methods and Applications’, Indian edition 2008.	
<i>Reference Text Books:</i>	
<ol style="list-style-type: none"> 1. Jain M.K. Iyengar, S.R.K and Jain R.K. “Numerical Methods for Scientific and Engineering Computation”. 2. Shastry S.S – “Introductory Methods of Numerical Analysis” , PHI(2005) 3. J. Medhi “Statistical Methods” , New age Publications 1992. 4. Ronald E Walpole and Raymond H Meyers : Probability and Statistics for Engineers and Scientists (Second Edition) 5. Srimani P.K and Vinayaka Murthy M, text book of probability and Statistics, Subash Publications 2000. 	

2BDASTT: DATA STRUCTURE USING C

Total Teaching Hours : 52

No. Of Lecture
Hours/Week: 4

Max Marks:70

Credit : 4

Course Objective:

- Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.
- Illustrate linear representation of data structures: Stack, Queues, Lists.
- Demonstrate sorting and searching algorithms.
- To familiarize with basic techniques of algorithm analysis, master implementation of linked lists, binary trees and graph algorithms
- Find suitable data structure during application development/Problem Solving

Course Outcome:

Upon successful completion of the course the student will be able to:

- Use different types of data structures, operations and algorithms
- Apply searching and sorting operations.
- Use stack, Queue, Lists, Trees in problem solving.
- Implement the applications of data structures

UNIT 1 -INTRODUCTION

Teaching Hours :10

Introduction and Overview: Definition, Elementary data organization, Data Structures, data structures operations, Abstract data types, algorithms complexity, time-space tradeoff. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. String Processing: Definition, Storing Strings, String as ADT, String operations, word/text processing, Pattern Matching algorithms

UNIT 2- ARRAYS

Teaching Hours :10

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Sorting: Bubble sort, Insertion sort, Selection sort, Searching: Linear Search, Binary search,

Multidimensional arrays, Matrices and Sparse matrices.

UNIT 3 –LINKED LIST

Teaching Hours :12

Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list.

UNIT 4 –STACKS AND QUEUES

Teaching Hours :12

Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues – Definition, Array representation of queue, Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT 5 -TREE

Teaching Hours :08

Definitions, Binary trees, Representing binary trees in memory, Traversing Binary Trees, Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree. Introduction to Graphs.

Text Books:

1. Yashwant Kanetkar, “Data Structure Through C”, 3rd Edition, BPB Publication 2019
2. Seymour Lipschutz, “Data Structures with C”, Schaum’s OutLines, Tata McGraw-Hill, 2017.
3. Horowitz, Sahni and Anderson-Freed, “Fundamentals of Data Structures in C”, 2nd Edition, University Press, 2008

Reference Text Books:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2013.
2. Forouzan, “A Structured Programming Approach using C”, 2nd Edition, Cengage Learning India, 2013.
3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla, “Data Structures and Program Design using C”, Pearson Education, 2009.

2BJAVAT: OBJECT ORIENTED PROGRAMMING USING JAVA

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit : 4
Course Objective:	
<ul style="list-style-type: none">● Gain knowledge about basic Java language syntax to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.● Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.● Understand the principles of inheritance, packages and interfaces , web based concepts like Applets, AWT controls.	
Course Outcomes:	
At the end of this course student will: <ul style="list-style-type: none">● Understand the use of OOPs concepts. Able to solve real world problems using OOP techniques.● understand the use of abstraction. Able to understand the use of Packages and Interface in java. Able to develop and understand exception handling, multithreaded applications with synchronization.● understand the use of Event and event handling . Able to design GUI based applications and develop applets and AWT classes.	
UNIT 1: Introduction to JAVA	Teaching Hours :10
Fundamentals of Object Oriented Programming – Introduction, Object Oriented Paradigm – Basic Concepts of Object Oriented Programming – Benefits of OOP- Applications of OOP. JAVA evolution, Java History, Java Features, How Java Differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Java Environment. Overview of JAVA Language: Introduction, Simple Java program, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variables, Symbolic Constants.	

UNIT 2: Classes, Arrays, Strings and Vectors	Teaching Hours :10
<p>Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One-dimensional Arrays, Creating an Array, Two -Dimensional Arrays, Strings, Vectors, Wrapper Classes</p>	
UNIT 3: Interfaces, Packages, and Multithreaded Programming	Teaching Hours :12
<p>Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.</p> <p>Packages: Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes.</p> <p>Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the ‘Runnable’ Interface.</p>	
UNIT 4: Managing Exceptions, Applet Programming	Teaching Hours :12
<p>Managing Errors and Exception: Introduction, Types of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.</p> <p>Applet Programming: Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Applet Tag, Adding Applet to HTML File, running the Applet, Displaying Numerical Values, Getting Input from the User.</p>	

UNIT 5: Graphics Programming , AWT controls

Teaching Hours :08

Graphics programming: Introduction, The Graphics Class, Lines and rectangles, circles, and Ellipses, Drawing Arcs, Drawing Polygons. AWT controls: Button, Choice, Label, checkbox, checkboxgroup, textfield.

Events and Event Handling.

Essential Text Books:

1. Programming with Java by E Balagurusamy, 6th Edition

Reference Text Books:

1. JAVA 2: THE COMPLETE REFERENCE , by Herbert Schildt, 11th Edition

2. Core Java Volume I--Fundamentals: by [Cay Horstmann](#), 11th edition

2BOPSYT: OPERATING SYSTEM

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit :4
Course Objective:	
<ul style="list-style-type: none"> • To understand the services provided by and the design of an operating system. • To understand the structure and organization of the file system. • To understand what a process is and how processes are synchronized and scheduled. 	
Course Outcome:	
<p>Upon successful completion of the course the student will be able to:</p> <ul style="list-style-type: none"> • To understand the basic working process of Operating System. • Understand the importance of Process and scheduling. • Understand the issues in synchronization and Memory management. 	
UNIT 1:Introduction	Teaching Hours :10
<p>Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls, System programs, Virtual machines. Process Management: Process Concept, Process Scheduling, Co – Operating process, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling, Algorithm evolution</p>	
UNIT 2: Process Synchronization and deadlocks	Teaching Hours :10
<p>The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks – system model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling</p>	
UNIT 3:Memory management	Teaching Hours :12
<p>Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging in Mastics and Intel 386, Virtual memory- Demand paging and it's performance, Page replacement algorithms, Allocation of frames, thrashing, page size and other considerations. Demand Segmentation.</p>	
UNIT 4: File management (Systems, Secondary Storage Structure)	Teaching Hours :12
<p>File Concepts, Access methods, Directory Structure, Protection and consistency, File system structure, Allocation methods, Free space management, Directory Implementation, Efficiency and Performance, Recovery. Disk Management (Structure, Disk Scheduling Methods): Disk Structure & Scheduling methods, Disk management, Swap – Space management.</p>	

UNIT 5: Protection and Security**Teaching Hours : 08**

Goals of protection, Domain Protection, Access matrix, Security Problem, Authentication, One time password, program threats, System threads. Case Study of Windows and Linux Operating System

Essential Text Books:

1. A. Silberschatz, P.B. Galvin and G. Gagne, *Operating System Concepts*.8th Edition, New Delhi : Wiley India, 2011.

Reference Text Books:

1. Stalling William, *Operating Systems: Internals and Design Principles*. 7th Edition, Prentice Hall, 2011.
2. Dietel et al, *Operating System*. 3rd Edition. Pearson Education, 2004.
3. A.S. Tanenbaum, *Modern Operating Systems*. 3rd Ed, Prentice Hall, 2007.

3rd Sem B.C.A

III Semester								
	Paper		Hours/Week	Marks			Credit	Total Credit
	Code	Title		IA	Exam	Total		
Part-1	3BLENGT	English	4	30	70	100	2	24
		Kan/San/Hin	4	30	70	100	2	
Part-2	3BDBMST	Database Management System	4	30	70	100	4	
	3BPYHT	Python Programming	4	30	70	100	4	
	3BSWEGT	Software Engineering	4	30	70	100	4	
	3BBSALT	Business Analytics	4	30	70	100	4	
	3BDBMSP	DBMS-Lab	3	15	35	50	1	
	3BPYTHP	Python Programming - Lab	3	15	35	50	1	
Part-3		Value Education	2	15	35	50	1	
		ID Paper	2	15	35	50	1	
Total Marks and Credits			34	240	560	800	24	

3BDBMST: DATABASE MANAGEMENT SYSTEM

Total Teaching Hours : 52	No. Of Lecture Hours/Week: 04
Max Marks: 70	Credit : 4
Course Objective:	
<ul style="list-style-type: none">• Provide a strong foundation in database concepts, technology, and practice.• Practice SQL programming through a variety of database problems.• Demonstrate the use of concurrency and transactions in database.• Design and build database applications for real world problems• Illustrate the concepts of NOSQL	
Course Outcome:	
<ul style="list-style-type: none">• Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.• Use Structured Query Language (SQL) for database manipulation.• Design and build simple database systems.• Develop application to interact with databases• Use NoSQL Databases (Document-oriented, key value pairs, column-oriented and Graph).	
UNIT 1: INTRODUCTION	Teaching Hours :10
Data, Database, Database management system, Characteristics of the database approach, Database users, Advantages of Using a DBMS and When not to use a DBMS. Data Models, Categories of data models, Schemas, DBMS Architecture and Data Independence, The Three schema architecture, DBMS Languages and Interfaces, Classifications of DBMS	
UNIT 2: E-R MODEL AND FILE ORGANIZATIONS	Teaching Hours :10
Entity types, Entity Sets, Attributes and Keys. Relationships, Relationship types, Roles and Structural constraints. Weak and strong Entity Types and Drawing E- R Diagrams. Naming conventions and design issues, Preparing E-R diagrams for a problem. Record storage and primary file organization, heap files, Single Level Ordered Indexes, Primary indexes, Clustering indexes and Secondary indexes.	
UNIT 3: RELATIONAL MODEL AND NORMALIZATION.	Teaching Hours 10
Relation, Integrity constraints - domain, entity and Referential integrity constraints, Basic Relational Algebra operations, select, project and join operations. Functional dependencies and Normalization for Relational Databases - Normalization concepts, first, second, third normal forms and Boyce-Codd normal form.	

UNIT 4: STUCTURED QUERY LANGAUGE(SQL)	Teaching Hours :10
SQL Basics, SQL data definition and data types, specifying constraints in SQL, Basic queries like INSERT, DELETE ,ALTER and UPDATE statements in SQL, More Complex SQL queries for grouping and built in functions, Joining tables using equi, left, right joins	
UNIT 5: DATABASE SECURITY	Teaching Hours :06
Introduction to database security issues, discretionary access control based Granting/Revoking of privileges, account level and relation level security, Introduction to statistical Database security.	
UNIT 6: NOSQL DATABASE	Teaching Hours :06
Why NoSQL? The value of Relational Databases, getting at persistent data, concurrency, integration, A(mostly) standard model, impedance Mismatch, Application and Integration Databases, Attack of the clusters, the emergence of NoSQL, Aggregate Data Models; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-family stores, summarizing Aggregate-Oriented Databases. More Details on Data Models; Relationships, Graph Databases, Schemaless Databases, Materialized views, Modeling for Data Access.	
<i>Essential Text Book:</i>	
<ol style="list-style-type: none"> 1. Fundamentals of Database systems, by Elmasri Ramez and Navathe, 7th Edition, Pearson. 2. Database Management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill. 3. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage p. & Fowler, Pearson Addison Wesley, 2012 	
<i>Reference Text Books:</i>	
<ol style="list-style-type: none"> 1. <i>Database System Concepts</i>, By Silberschatz, Korth, Sudarshan, 6th Edition, McGraw Hill, 2013. 2. Database principles fundamentals of Design,Implementation and Management, Coronel, Morris and Rob, Cengage Learning 2012. 3. Introduction to database management system by Atul Kahate, 1/e pearson publication. 4. Dan Sullivan, “NoSQL for Mere Mortals”, 1st Edition, Pearson education India 2015. 5. Dan McCreary and Anny Kelly, “ Making Sense of NoSQL: A guide for Managers and the rest of us”, 1st edition, manning publication/ Dreamtech press, 2013. 6. Kristina Chodorow, “Mongodb: The Definitive Guide – powerful and scalable data storage”, 2nd Edition, O’Reilly Publications, 2013. 	

3BPYHT: PYTHON PROGRAMMING

Total Teaching Hours: 52	No. Of Lecture Hours/Week: 04
Max Marks: 70	Credits : 4
Course Objective:	
<ul style="list-style-type: none"> Learn the syntax and semantics of Python programming language. Illustrate the process of structuring the data using lists, tuples and dictionaries. Demonstrate the use of built-in functions to navigate the file system. Implement the Object Oriented Programming concepts in Python. Demonstrate the use of Regular Expression and handling file operations 	
Course Outcome:	
<ul style="list-style-type: none"> Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. Discover the commonly used operations involving regular expressions and file system. Interpret the concepts of Object-Oriented Programming as used in Python. Problem solving and programming capability. 	
<p>Overview: Why Python, features, setting up path, working with python, basic syntax, identifiers, keywords, variable and data type operators, comments.</p> <p>Object oriented programming: Introductions, OOP, classes, class attributes, classes with multiple objects, instances, instance attributes, Encapsulation, Basics of polymorphism: Operator and function overloading, Constructor and Destructor, inheritance</p>	
UNIT 1: CONTROL STATEMENTS	Teaching Hours :12
<p>Indentation, Reading input, print output, type conversion.</p> <p>Condition statements: if, if-else, nested if</p> <p>Looping: for, while, Nested loop</p> <p>Control statements: Break, continue, pass</p> <p>Exception handling: try and except, raising exception.</p>	
UNIT 2: FUNCTIONS, MODULES & STRINGS	Teaching Hours :12
<p>Functions- Build in functions, function definition and calling the function, command line arguments, Lambda, MAP, Filters and User defined Functions.</p> <p>Modules: What are modules, modules and files, importing modules, Introduction to Numpy.</p> <p>Strings: str functions, slicing &Joining, string methods, string formatting</p>	
UNIT 3: TUPLES, LIST & DICTIONARIES	Teaching Hours 10
<p>Tuples and sets: basic tuple operations, indexing and slicing in tuples, built in function, tuple methods, sets, sets methods, frozenset.</p> <p>Lists: list function, indexing & slicing, list methods.</p> <p>Dictionaries: creating, accessing and modifying, dictionary methods.</p>	

UNIT 4: REGULAR EXPRESSION, ERROR & EXCEPTIONS,
MAGIC METHODS

Teaching Hours :08

Regular expression: using special characters, regular expression methods.

Error & Exceptions: Introduction to exceptions in python, detecting and handling exceptions, exceptions as strings, raising exceptions, assertions, standard exceptions.

Magic Methods: Magic Method syntax, Available Methods

Introduction to file operation: opening a file, Techniques for reading files, writing files

UNIT 5: DECORATORS, GENERATORS & DATABASE

Teaching Hours :10

Decorators: Understanding Decorators, Decorator Syntax, Decorators Functions, Decorator classes.

Context Managers: Context manager syntax, when you should write context managers.

Generators: Understanding Generators, Generator syntax, Generator Examples

OOP for Database Programming: Introduction, Architecture, Steps for Connecting Database, Basic Operations with Examples

Essential Text Book:

1. Python for Everybody: Exploring Data in Python 3, by Dr. Charles Russell Severance, Sue Blumenberg.
2. Introduction to Python Programming by Gowrishankar S, Veena A, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372,
3. Programming in Python 3 A Complete Introduction to the Python Language, Mark Summerfield, Addison-Wesely Reprint 2011
4. "Beginning Python: from novice to professional". 3rd Edition, Hetland, Magnus Lie., Apress, ISBN 978-1-4842-0029-2, 2017
5. An Introduction to computer Science using Python 3.6, Paul Gries, Jennifer Campbell, Jason Montojo, 3rd Edition, Shroff publishers and distrubtors Pvt, Ltd. ISBN: 13:978935213681-0, 2018

Reference Text Books:

1. Barry, Paul, *Head First Python*, 2nd Edition, ORIelly, 2012.
2. Lutz, Mark, *Learning Python*, 4th Edition, O Rielly, 2013
3. Sneeringer, Luke, "Professional Python", John Wiley & Sons, ISBN -978-1-119-07085-6, 2016.
4. Wesley J Chun, "Core Python Programming", third edition, Pearson Education, ISBN 13: 978-0-13-267820-9, 2012
5. Think Python, Allen Downey, Version 2.0.17, Green Tea Press, Needham, Massachusetts, 2012

3BSWEGT: SOFTWARE ENGINEERING

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit : 4
Course Objective:	
<ul style="list-style-type: none">• To acquire strong fundamental knowledge of software engineering.• Know how costs, schedule and quality drive a software project.• Learn the role of software process and a process model in a project.	
Course Outcome:	
On successful completion of this course, the students will be able to	
<ul style="list-style-type: none">• How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment• An ability to work in one or more significant application domains• Work as an individual and as part of a multidisciplinary team to develop and deliver quality software	
UNIT 1: INTRODUCTION	Teaching Hours :12
Introduction: Software Products and Software process, Process models: Waterfall model, Evolutionary Development, Bohemia's Spiral model, Overview of risk management, Process Visibility, Professional responsibility.	
Computer based System Engineering: Systems and their environment, System Procurement, System Engineering Process, System architecture modelling. Human Factors, System reliability Engineering.	
Requirements and Specification: The requirement Engineering Process, The Software requirement document, Validation of Evolution of requirements, Viewpoint – oriented & method based analysis, system contexts, Social 7 organizational factors . Data flow, Semantic, Objects, models , Requirement Specification, Non functional requirement	

UNIT 2: Software Prototyping	Teaching Hours :10
<p>Software Prototyping: Prototyping in software process, Prototyping techniques, User interface prototyping.</p> <p>Software Design: Design Process, Design Strategies, Design Quality, System Structuring control models, Modular decomposition, Domain Specific architecture.</p>	
UNIT 3: Object Oriented function oriented design	Teaching Hours :10
<p>Object Oriented function oriented design: Objects, object Classes and inheritance Object identification, An object oriented design example, Concurrent Objects, Data flow design Structural decomposition, Detailed Design, A Comparison of design Strategies.</p> <p>User interface design: Design Principles, User System interaction, Information Presentation, User Guidance, Interface Evaluation.</p>	
Unit 4: Software Reliability and reusability	Teaching Hours :10
<p>Software Reliability and reusability: Software reliability metrics , Software reliability Specification , Statistical testing, Reliability Growth modeling, Fault avoidance & tolerance, Exception handling & defensive programming , Software development with reuse, Software’ development for reuse , Generator based reuse, Application System Portability.</p>	
UNIT 5: Software Verification and Validation	Teaching Hours :10
<p>Software Verification and Validation: The testing Process , Test Planning & Strategies, Black Box , Structural, interface testing , Program inspections , Mathematically based verification, Static analysis tools, Cleanroom software development.</p> <p>Management Issues: Project management, Quality management, Software cost estimation, Software maintenance</p>	
Text Books:	
1. Ian Sommerville – Software Engineering, 9 th Edition, Pearson Education Ltd, 2010.	
Reference Text Books:	
1. Roger S. Pressman – Software Engineering, A Practitioner’s approach, 7 th Edition, McGRAW-HILL Publication, 2010. 2. Pankaj Jalote, “An integrated approach to Software Engineering”, 3 rd Edition, Narosa Publishing House, 2013.	

3BBSALT: BUSINESS ANALYTICS

Total Teaching Hours : 52	No. Of Lecture Hours/Week: 4
Max Marks:70	Credit : 4
Course Objective:	
<ul style="list-style-type: none"> ● Understand and critically apply the concepts and methods of business analytics ● Identify, model and solve decision problems in different settings ● Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity 	
Course Outcome:	
<p>On successful completion of this course, the students will be able to</p> <ul style="list-style-type: none"> ● Identify and describe complex business problems in terms of analytical models. ● Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives. ● Translate results of business analytic projects into effective courses of action. 	
UNIT 1: Business view of Information technology Applications	Teaching Hours :10
<p>Business enterprise Organization, Its functions and core business processes, Key purpose of IT in Business, Enterprise application(ERP/CRM.etc),Characteristics of Internet, Information users and their requirements</p>	
UNIT 2: Digital Data	Teaching Hours :12
<p>Introduction, Getting to know structured Data-Characteristics, where does it come from, hassle free retrieval, unstructured data-How to manage, How to store, How to extract, semi structured data- How to manage, How to store, How to extract, model, difference between semi structured and structured data</p>	
UNIT 3: Introduction to OLTP and OLAP	Teaching Hours :10
<p>OLTP-Queries, advantages, challenges, OLAP-one dimensional, two dimensional, three dimensional data, different OLAP architecture, Data models of OLTP and OLAP, Role of OLAP tools in BI architecture, LAP operations on multidimensional data</p>	

UNIT 4: Basics of Data Integration	Teaching Hours :10
Need for Data warehouse, Definition of Data warehouse, Data Mart, Then an ODS, Goals of Data Date Warehouse, Goals of Data Warehouse, Constituents a Data warehouse, Data sources, Data mapping, Data staging, Data Integration, Data Integration Technologies, Data qualities, Data profiling, A case study from the health care domain.	
UNIT 5: BI-Definitions and concepts	Teaching Hours :10
BI component framework-Business layer, operation layer, Implementation Layer.BI for management, process improvement, performance improvement, Customer experience improvement, BI-users, Managing and maintenance of BI systems Managing operations for business continuity	
Text Books:	
1. Fundamentals of Business Analytics-R.N.Prasad and Seema Acharya	
Reference Text Books:	
1. Business Analytics an application focus –R.Ohri 2. R.Sharda, D.Delen& E .Turban,Business Intelligent and Analytical Systems	

4th Sem B.C.A

IV Semester								
	Paper		Hours/Week	Marks			Credit	Total Credit
	Code	Title		IA	Exam	Total		
Part-1	4BLENGT	English	4	30	70	100	2	21
		Kan/San/Hin	4	30	70	100	2	
Part-2	4BCNETT	C#. NET Programming	4	30	70	100	4	
	4BSWTET	Software Testing	4	30	70	100	4	
	4BUNIXT	Unix Programming	4	30	70	100	4	
	4BCNETP	C#.NET – Lab	3	15	35	50	1	
	4BUNIXP	Unix - Lab	3	15	35	50	1	
	4BPROJP	Mini Project	3	15	35	50	1	
Part-3		Value Education	2	15	35	50	1	
		ID Paper	2	15	35	50	1	
Total Marks and Credits			33	220	525	750	21	

4BCNETT: C# .NET Programming

Total Teaching Hours : 52	No. Of Lecture Hours/Week: 04
Max Marks:70	Credit :04
Course Objective:	
<ul style="list-style-type: none">• The .NET framework can work with several programming languages such as C#, VB.NET.• Student will be familiar with C#, ASP.NET, VB.NET and able to develop a web application or windows using dot net technologies.• Students will gain the skills and project-based experience needed for entry into web application, windows application	
Course Outcome:	
<ul style="list-style-type: none">• Students will be able to write a console application and Windows application• Students are able to develop a dynamic webpage by the use of ASP.NET, C#.• Students are able to understand the ADO.NET and MVC architecture.	
UNIT 1- Introduction to C#	Teaching Hours :06
Why C#, Evolution of C#, Characteristics of C#, Applications, Structure of C# program, Name spaces, providing interactive inputs, multiple main methods, C# tokens, literals, variables, data types, value types, reference types, Boxing and Unboxing, for-each statement, Methods in C#, Handling Arrays	
UNIT 2 – Classes and Objects	Teaching Hours :10
Defining a class, Adding Variables, Adding Methods, member access modifiers, creating objects, accessing class members, static members and static constructors, constant members and read-only members, properties, indexers, Delegates and Events.	
UNIT 3 – Controls	Teaching Hours :06
Basic Windows control classes, auto post back, Standard Controls- Label control, Textbox control, button control, Image button control, list box, Radio button control, Dialog boxes, Menu Strip controls.	
UNIT 4 –Developing ASP.NET Applications	Teaching Hours :04
ASP.NET Application, ASP.NET file types, in directory, Code behind model, The Global.asax application File, web.config file.	

UNIT 5 –Validation and Rich Controls and State Management	Teaching Hours :10
Validation Controls, Base Validator class, Required field validator, Range Validator, Compare Validator, Regular expression Validator, Custom Validation, Validation summary, login controls, Navigation controls, View State, Query String, Cookies, Session State, Application State.	
UNIT 6 –Data Access with .NET	Teaching Hours :08
ADO.NET overview, Shared Classes, Using database connections, commands, Executing Commands-ExecuteNonQuery(), ExecuteReader() and ExecuteScalar() The data reader, The DataSet Class-Data Tables ,Data Columns, Data rows.	
UNIT 7 –Viewing.NET Data and Web Application	Teaching Hours :04
The Data Grid View Control, Data List View Control, Detail View Control, Simple Web Application examples.	
UNIT 8 –Introduction to MVC	Teaching Hours :04
MVC Architecture, Understanding the MVC design pattern and how it's applied in ASP.NET MVC, Understanding Model, Understanding View, Understanding Controller, Key benefits of ASP.NET MVC, Advantages of MVC based web application.	
Text Books:	
<ol style="list-style-type: none"> 1. The Complete Reference C# by Herbert Schildt, 8th edition 2. ASP.NET Complete Reference by Matthew MacDonald, TataMcGraw-hill Publications. First edition 3. Beginning SQL Server 2005 Programming by Robert Vieira, wrox publication, 2006 4. Professional ASP.NET MVC 4, Jon Galloway, Phil Hacack, Wrox publication, 2012 	
Reference Text Books:	
<ol style="list-style-type: none"> 1. Comdex .NET Programming by Vikas Gupta, Dreamtech press. 2014 2. Programming in C# by E Balagurusamy. Fourth Edition, TataMcGraw-hill Publications. 3. Professional C# 2005 by Christian Nagel and Others, Wrox Publications, 3rd Edition 	

4BSWTET: Software Testing

Total Teaching Hours: 52

No. Of Lecture
Hours/Week: 4

Max Marks:70

Credit : 4

Course Objective:

- To study the fundamentals and principles of software testing.
- To learn few techniques of testing
- To identify the needs of software test automation

Course Outcome:

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

- To understand the characteristics of Agile Framework
- To have basic understanding of Engineering Activities
- To understand the significance of testing
- To learn the essentials of Reporting
- To have knowledge on Automation Testing

UNIT 1: INTRODUCTION TO SOFTWARE TESTING

Teaching Hours :14

Agile Software Development in Scrum:

- Introduction to Agile – Scrum
- Scrum Framework: Roles, Activities, Artefacts
- Roles: Product Owner, Scrum Master, Development team (BA, Dev, QA etc.
- Activities: Backlog Refinement, Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective
- Artefacts: Product Backlog, Sprint Backlog, Product Increment

Testing as an Engineering Activity:

- Software Test Life Cycle, Testing as a Process, Basic Definitions
- Software Testing Principles, Role in a Software Development Organization
- Test Scenarios, Test Case Design Techniques, Test Case Review, Test Case Prioritization
- Requirement Traceability Matrix

Origins of Defects, Defect Life Cycle, Defect Repository, Defect Prioritization, Defect Examples, Developer/Tester Support for Developing a Defect Repository, Defect Management Tools

UNIT 2: LEVELS OF TESTING	Teaching Hours :08
<ul style="list-style-type: none"> - The Need for Levels of Testing: Unit Test and Recording results - Types of testing - Smoke Testing – Build verification - Functional and Non-Functional Testing - Integration testing, Designing Integration Tests, - System Testing, Regression Testing , Ad-hoc Testing - Usability and Accessibility testing. - Performance testing – Reliability, Stress, Load testing - Internationalization testing and Globalization testing - User Acceptance Testing, Alpha and Beta Tests 	
UNIT 3: TEST MANAGEMENT	Teaching Hours :04
<ul style="list-style-type: none"> - People and organizational issues in testing - Organization structures for testing teams - Testing services - Test Strategy and Planning, Test Estimation, Test Plan Components, Locating Test Items, - Test Management: Test process - Reporting Test Results, Test Management Tools - Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group 	
UNIT 4: REPORTING	Teaching Hours :04
<ul style="list-style-type: none"> - Test metrics and measurements, - Static Testing, Types of reviews - Status Meetings: Daily and Weekly Status meeting - Project, progress and productivity metrics - Reports and Control Issues - Criteria for Test Completion and Reporting Review Results - Evaluating software quality: Defect prevention and Testing maturity model 	
UNIT 5: CONTROLLING AND MONITORING	Teaching Hours :04
<ul style="list-style-type: none"> - Software test automation - Skills needed for automation - Scope of automation - Design and architecture for automation - Requirements for a test tool - Challenges in automation 	

Unit – 6: AUTOMATION TEST

Teaching Hours :18

- Case study and open source testing tools – Selenium
- Automation Framework

Text Books:

1. Srinivasan Desikan and Gopaldaswamy Ramesh, Software Testing ' Principles and Practices', Pearson education, 2007.

Reference Text Books:

1. Agile Software Development in Scrum Ken Schwaber, Mike Beedle
2. BorisBeizer,*SoftwareTestingTechniques, SecondEdition, Dreamtech, 2011.*
3. ElfriedeDustin,*EffectiveSoftwareTesting, FirstEdition, PearsonEducation, 2010.*
4. Renu Rajani, Pradeep Oak, *Software Testing – Effective Methods, Tools and Techniques*,TataMcGraw Hill,2008.

4BUNIXT: UNIX PROGRAMMING

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit : 4
Course Objective:	
<ul style="list-style-type: none">● To provide introduction to UNIX Operating System and its File System● To become fluent with the systems calls provided in the unix environment● To gain an understanding of important aspects related to the SHELL	
Course Outcome:	
On successful completion of this course, the students will be able to	
<ul style="list-style-type: none">● Explain UNIX system and use different commands● Understand the basic functioning of UNIX operating systems and shell programming.● Able to identify and use unix utilities to create and manage file processing operations.	
UNIT 1: Introduction	Teaching Hours :12
Introduction: History, salient features, Unix system architecture, Unix command format, Unix internal and external commands, Directory commands, File related commands, Disk related commands, General utilities, Wild cards	
Files and file organizations: Unix files ,categories of files, Hidden files ,organizing the unix files, Path names,The dot(.) and double(..) filenames, Displaying, printing, comparing files, File Attributes, Ownership of files, Times associated with files, The umask command-default file permission.	
UNIT 2: File System & Process management	Teaching Hours :12
Unix File System: Boot, Inode, super and data block, in-core structure, Directories, conversion of pathname to inode, inode to a new file, Disk block allocation.	
Process Management: Process basics, process status: ps , System process, Mechanism of process creation, Process state and Zombies, User vs, kernel mode, context of a Process, foreground background processes, Process scheduling commands, Process terminating and examining commands.	
Special Tools and Utilities: Standard I/O, Redirection, Pipe and pipe line-connecting commands Filters, signals and Interrupts, file compression facilities.Unix	

system calls and library functions

UNIT 3: Shell Programming

Teaching Hours :10

Shell Programming: Vi editor basics, different modes of vi, different ways of invoking and quitting vi, shell types, shell command line processing, shell script features, executing a shell script, shell variables, system and user-defined variables, positional parameters, The \$? Command, set command, expr command, shell screen interface, read and echo statement, command substitution, escape sequence characters, shell script arguments, exit, test command, file test, string test, numeric test.

UNIT 4: Conditional Control Structures

Teaching Hours :10

Branching control structures: Loop control structures, the Structure-while, until, for, statements. Jumping Control Structures – break, continue, exit ,performing real arithmetic, The here document, sleep command, Debugging scripts, The script command ,The exec and eval command Stream editor SED

AWK: syntax of AWK statement, structure of AWK script, operational mechanism, variables, addressing, patterns, operators, control structures, Functions, Simple awk programs, executing AWK script with the shell

UNIT 5: Unix System Communication

Teaching Hours :08

Unix System Communication: The communication process , write, read, wall commands, sending and handling mails, news command, talk command

System Administration: Roles of a System Administrator, Unix security, The find command-locating files File System Maintenance, System Startup and Shutdown, User Management, Backup and Restore, Demons, Domain Name System DNS, Distributed File System.

Text Books:

1. M.G.Venkateshmurthy, “Introduction to UNIX & SHELL Programming”, First Edition, Pearson Education, 2004
2. SumitabhaDas, Unix Concepts and Applications, 4th Edition, Tata McGraw Hill

Reference Text Books:

1. Forouzan, “Unix and Shell Programming”, 1st Edition, 2008 Cengage Learning India.
2. UNIX and Shell Programming, Archana Verma, Firewall Media.

5th Sem B.C.A

V Semester								
	Paper		Hours/Week	Marks			Credit	Total Credit
	Code	Title		IA	Exam	Total		
Part-1	5BADAGT	Analysis and Design of Algorithms	4	30	70	100	4	23
	5BARIGT	Artificial Intelligence	4	30	70	100	4	
	5BCOMNT	Computer Networks	4	30	70	100	4	
	5BOOADT	Object Oriented Analysis and Design	4	30	70	100	4	
	5BWEBPT	Web Programming	4	30	70	100	4	
Part-2	5BADAGP	ADA- Lab	3	15	35	50	1	
	5BWEBPP	Web Programming – Lab	3	15	35	50	1	
	5BPROGP	Project Lab	3	15	35	50	1	
Total Marks and Credits			29	195	455	650	23	

5BADAGT: ANALYSIS & DESIGN OF ALGORITHMS

Total Teaching Hours : 52

No. Of Lecture
Hours/Week:4

Max Marks:70

Credit: 04

Course Objective:

- To learn the Computational problem-solving techniques.
- To recognize the use of several design techniques like greedy, divide-and-conquer, dynamic programming etc.
- To write and solve recurrence relations for recursive algorithms. Determine asymptotic growth rates for algorithms and prove correctness of simple algorithms.

Course Outcome:

- Describe computational solutions to well known problems like searching, sorting etc. Analyse algorithms and improve the efficiency of algorithm
- Estimate the computational complexity of different algorithms.
- Devise an algorithm using appropriate design strategies for problem solving. Apply different designing methods for development of algorithms realistic problems, such as divide and conquer, greedy. Understand to construct minimal spanning trees and find shortest path between source and

UNIT 1: INTRODUCTION

Teaching Hours :12

Introduction: What is an Algorithm?, Algorithm Specification ,Analysis Framework , Performance Analysis: Space complexity, Timecomplexity . Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω),Theta notation (Θ), and Little-oh notation (o),Important Problem Types: Sorting, Searching, String processing, Graph Problems. Fundamental Data Structures: Stacks, Queues, Graphs, Trees.

UNIT 2: DIVIDE AND CONQUER

Teaching Hours :14

Divide and Conquer: General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort , Advantages and Disadvantages of divide and conquer.
Decrease and Conquer Approach, depth first search and breadth first search.

UNIT 3: Dynamic Programming

Teaching Hours :10

Dynamic Programming: General method, computing Binomial coefficient, Warshall's Algorithm, All Pairs Shortest Paths, Floyd's Algorithm, Optimal Binary Search Trees, Travelling Sales Personproblem .

UNIT 4: Greedy Method	Teaching Hours :10
Greedy Method: General method, Knapsack Problem, Job sequencing with deadlines. Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm. Single source shortest paths: Dijkstra's Algorithm.	
UNIT 5: Backtracking and Branch and Bound	Teaching Hours :06
Backtracking: General method, N-Queens problem , Hamilton circuit problem, Sum of subsets problem . Branch and Bound: Assignment Problem.	
Essential Text Books:	
<ol style="list-style-type: none"> 1. Introduction to the Design and Analysis of Algorithms, Anany Levitin:, 3rd Edition, 2009. Pearson. 2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press. 	
Reference Text Books:	
<ol style="list-style-type: none"> 1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI. 2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education). 	

5BARIGT: ARTIFICIAL INTELLIGENCE

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit: 04
Course Objective:	
<ul style="list-style-type: none">To Introduce basic theory and practical techniques in Artificial Intelligence. The course would provide emphasis to the principles and applications of Artificial Intelligence.	
Course Outcome:	
<ul style="list-style-type: none">Understand the basic of AI, AI Techniques and ability to apply knowledge representation and reasoning.Familiar with natural language processing, grammars, parsing techniques, semantic analysis and representations.Understand expert system, rule based system architecture, knowledge aquisition and knowledge mining.	
UNIT 1: INTRODUCTION	Teaching Hours :10
What is AI, Importance of AI, Early works of AI, AI and related fields Definition and importance of Knowledge, Knowledge based system, Representation of Knowledge, Knowledge organization, Knowledge manipulation, Acquisition of knowledge,	
UNIT 2: LISP	Teaching Hours :06
LISP: Syntax and numeric function, List manipulation function, Function, Predicates Conditionals, Input,output and local variables, Iteration and Recursion, Property lists and arrays.	
UNIT 3: STRUCTURED KNOWLEDGE	Teaching Hours 06
Association network, Frame Structure Conceptual dependencies and scripts	
UNIT 4: NATURAL LANGUAGE PROCESSING	Teaching Hours :10
Overview of Linguistics, Grammar and languages, Basic parsing techniques, Semantic analysis Natural language generation, Natural language system.	

UNIT 5: EXPERT SYSTEM	Teaching Hours :10
Rule based system architecture, Nonproduction system architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.	
UNIT 6: VISUAL IMAGE UNDERSTANDING	Teaching Hours:10
Image: transformation and low level Processing, Intermediate level processing, Describing and labeling objects, High level processing,	
Essential Text Books:	
1. E. Rich and K. Knight, <i>Artificial Intelligence</i> , 2 nd Edition. New york: TMH, 2012	
Reference Text Books:	
1. S. Russell and P. Norvig, <i>Artificial Intelligence A Modern Approach</i> , 2 nd Edition	

5BCOMNT: COMPUTER NETWORKS

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit: 04
Course Objective:	
<ul style="list-style-type: none">To develop an understanding of the fundamental concepts of Computer networking, Network components, Layered Network Architecture, OSI reference mode, TCP/IP reference model, Network protocols, Routing algorithms ,DNS, Network Security	
Course Outcome:	
<ul style="list-style-type: none">Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.Have a basic knowledge of the use of cryptography and network security.Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols	
UNIT 1: INRODUCTION	Teaching Hours :12
Uses of computer networks, network hardware, personal area networks, local area networks, metropolitan area networks, wide area networks, internetworks, network software, protocol hierarchies, design issues for the layers, connection-oriented versus connectionless service, service primitives, the relationship of services to protocols, reference models, OSI reference model, TCP/IP reference model, physical layer, guided transmission media - , wireless transmission, switching.	
UNIT 2: THE DATA LINK LAYER	Teaching Hours :10
Services provided to the network layer, framing, error control, flow control, error-correcting codes, error-detecting codes, elementary data link protocols, a simplex stop-and-wait protocol , sliding window protocol, example data link protocols	
UNIT 3: NETWORK LAYER	Teaching Hours :10
Network layer : services of network layer , Connectionless Service and Connection-Oriented Service, Shortest path algorithm, Flooding, Routing algorithms, Congestion control, The network layer, IP addresses, IP version, Internet control protocols, OSPF,BGP	

UNIT 4: TRANSPORT LAYER	Teaching Hours :10
<p>Transportation layer: services provided to upper layer, Addressing ,Establishing and releasing connection ,flow control, buffering ,Multiplexing</p> <p>The internet transportation protocol TCP and UDP, Model connection management, TCP congestion control, TCP timer management Network performance measurement, Remote procedure call, Real time transport protocols</p>	
UNIT 5: APPLICATION LAYER	Teaching Hours :10
<p>Application layer ,Domain Name System– name space – Domain resource records – Name Servers ,Email – architecture and services – The user agent message Format and transfer, The WORLD WIDE WEB, Architectural overview, Network Security, Introduction to Cryptography</p>	
Essential Text Books:	
1. COMPUTER NETWORKS - ANDREW TANENBAUM - 5 th Edition ICE HALL	
Reference Text Books:	
<ol style="list-style-type: none"> 1. Behrouz A Forouzan, <i>Data communication and networking</i>, McGraw-Hill, 5th edition, 2011. 2. Networking Essentials – Third Edition – Jeffrey S. Beasley, PiyasatNilkaew 	

5BOOADT: OBJECT ORIENTED ANALYSIS AND DESIGN

Total Teaching Hours: 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit :4
Course Objective:	
<ul style="list-style-type: none">• To describe Object Oriented Analysis and Design concepts and apply them to solve problems• To Prepare Object Oriented Analysis and Design diagrams using Unified Modelling Language.• To analyses the problem and apply to real world problems	
Course Outcome:	
<ul style="list-style-type: none">• Understanding the concepts of Object oriented and design.• Modelling systems using uml diagrams.• To analyses the case study and apply UML notations	
UNIT 1: INTRODUCTION	Teaching Hours :08
Evolution of object oriented methodology, Comparison of traditional and object oriented methodology, Introduction to object oriented Concepts , Overview of Object oriented methodologies, Modeling, types of models: class, state and interaction models. Introduction to unified modelling language(UML), types of diagrams in UML.	
UNIT 2: CLASS MODELLING	Teaching Hours :12
Notations for Object, class, abstract classes and constraints. Links and associations: qualified associations, binary and ternary associations, multiplicity and its types, ordering and role names, Generalization and inheritance, single level, Multilevel and multiple inheritances, Aggregation and composition. Building class/object diagrams for a given problem statement.	
UNIT 3: STATE AND INTERACTION MODELLING	Teaching Hours :10
State Modeling: Events, States, Transitions and Conditions, nations used in State diagrams, exit and entry activities, Advanced State Modeling with Nested states, concurrency, synchronization with a case study	
Interaction modelling:	
Use case model: Actors, use cases with their notations, writing use cases for the scenarios, relationships in use case diagrams, Sequence models, Notations used, Procedural sequence models, Activity models, Notations used, Special constructs like swim lanes.	

UNIT 4: OBJECT ORIENTED ANALYSIS	Teaching Hours :12
<p>Process overview, object oriented Development life cycle, System Conception Devising a system concept, elaborating a concept and preparing a problem statement. Domain and Application Analysis: Overview of analysis, Domain class model, state and interaction model. Application Analysis, Application interaction model, state model and adding operations with a case study.</p>	
UNIT 5: OBJECT ORIENTED DESIGN	Teaching Hours :10
<p>System design: overview, steps involved in system design, Estimating performance, Making a reuse plan, Breaking a system into subsystems, Identifying concurrency, Allocation of sub-systems, Management of data storage, Handling global resources, Choosing a software control strategy, Handling boundary conditions, Setting the trade-off priorities and Common architectural styles. Class design: overview, Bridging the gap, Realizing use cases, Designing algorithms, Recusing downwards, Refactoring, Design optimization and Adjustment of inheritance using different methods.</p>	
Essential Text Books:	
<ol style="list-style-type: none"> 1. Object - Oriented Modeling And Design With Uml,- 2 E by Michael <u>Blaha</u> and James Rumbaugh- Pearson Education / PHI, 2007. 	
Reference Text Books:	
<ol style="list-style-type: none"> 1. Object oriented modeling and design by James Rumbaugh, Michael Blama, William Preerlani ,Frederick Eddy and William Lorensen, PHI 2. Object oriented analysis and design by Attulkahate 3. Object oriented analysis and design with applications (3rd edition)by Grady 	

5BWEBPT: WEB PROGRAMMING

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit: 04
Course Objective:	
<ul style="list-style-type: none">• Web programming gives a comprehensive introduction to web programming technologies like HTML, CSS , java script, php.• The course helps the student to create and use jQuery .• Build Dynamic web site using server side PHP Programming and Database connectivity.	
Course Outcome:	
<ul style="list-style-type: none">• Front-end development technologies including HTML, CSS.• Students are able to develop a dynamic and interactive webpage by the use of java script and jQuery.• Students are able to learn server side language.	
UNIT 1: Introduction, HTML5 and CSS	Teaching Hours :10
Introduction to OSI and TCP/IP reference models , Internet addressing, FTP, HTTP, Telnet, MIME, Email. Introduction to HTML5 ,HTML5 new attributes, HTML5 semantic elements, HTML5 Svg and Canvas.Introduction to CSS3 and its properties.	
UNIT 2: Java Script	Teaching Hours :10
Introduction to Java Script, Embedding Java script in HTML using the script tag, JS variables, JS comments, JS functions, validation, Document object model(DOM), DOM Objects(window, navigator, history, location) , DOM levels. Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators, Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp Document and its associated objects : document, Link, Event Handlers : General Information about Events, Defining Event Handlers, event.	
UNIT 3: Introduction to Bootstrap	Teaching Hours :10
Overview of BootStrap, bootstrap environment setup, bootstrap with css , grid system, layouts, dropdowns, buttons.	

UNIT 4: Introduction to jQuery and Anjular JS	Teaching Hours :14
<p>Introduction to jQuery. Structure of jQuery. Using jQuery and including .js file to HTML. Type of Selectors. Retrieving Page Content.Handling Events with jQuery.</p> <p>Introduction to Angular JS. Why Angular JS? Why MVC matters.Features of Angular JS,Model-View-Controller.</p>	
UNIT 5: PHP	Teaching Hours :08
<p>Introduction to PHP, PHP syntax, PHP variables, PHP loops, PHP functions, PHP Strings, PHP arrays, PHP sessions and cookies, Mysql database connection</p>	
<p>Essential Text Books:</p>	
<ol style="list-style-type: none"> 1. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2nd , DT Editorial Services , Dreamtech press. 2. HTML & CSS: The Complete Reference Fifth edition ,by Thomas A Powell- McGrawHill . 3. AngularJS, JavaScript, and jQuery by Brad Dayley , Brendan Dayley 4. PHP and MySQL Web Development by Luke Welling , Laura Thomson – fifth edition. 	
<p>Reference Text Books:</p>	
<ol style="list-style-type: none"> 1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax by Kogent Learning Solutions Inc.-dreamtech press 2. PHP: The Complete Reference by Steven Holzner- 2nd edition. 	

6th Sem B.C.A

VI Semester								
	Paper		Hours/Week	Marks			Credit	Total Credit
	Code	Title		IA	Exam	Total		
	6BMENGT	Communicative English	1	15	20	35	1	27
Part-1	6BDWDMT	Data Warehouse and Data Mining	4	30	70	100	4	
	6BJ2EET	Advanced Java	4	30	70	100	4	
	6BCLCMT	Cloud Computing	4	30	70	100	4	
	6BCMSYT	Content Management System	4	30	70	100	4	
	6BNWSCT	Network Security & Cryptography	4	30	70	100	4	
Part-2	6BJ2EEP	Advanced Java – Lab	3	15	35	50	1	
	6BPROJP	Main Project Lab	3	30	70	100	4	
	6BMENGP	Communicative English Lab	1	-	15	15	1	
Total Marks and Credits			28	210	490	700	27	

6BDWDMT: DATA WAREHOUSE & DATA MINING

Total Teaching Hours: 52

No. Of Lecture
Hours/Week:4

Max Marks:70

Credit: 04

Course Objective:

- To Understand the Concept of Data Warehouse and enterprise intelligence in industry.
- Learn the concept of database technology which has led to need for Data Mining and its application.
- Examine the types of data to be mined.
- Explore DWH and OLTP

Course Outcome:

- Understand the architecture of Data Warehouse, Online Analytical Processing and the applications of Data Mining and its Challenges and
- Analyze association rule mining algorithms and apply to find frequent patterns in a data set. Learn classification algorithms such as Decision Tree, Naïve Bayes classifier, K-Nearest neighbor used in machine learning
- Understand various clustering techniques to categories the data and gain knowledge in web mining, text mining, multimedia data mining etc.

UNIT 1: Introduction to Data Warehouse, Data Mining

Teaching Hours :12

Introduction to Data Warehouse- Multidimensional Data Model, Data warehouse Architecture, Implementation, Data warehouse to Data Mining.

Introduction to Data Mining- Kinds of Data, Kinds of Patterns. Data Preprocessing-

Descriptive Data Summarization, Data Cleaning, Data Integration and transformation, Data Reduction, Data Discretization and Concept hierarchy generation.

UNIT 2: MINING FREQUENT PATTERNS, ASSOCIATION AND CORRELATION

Teaching Hours :10

Basic concepts and a road map, Efficient and scalable frequent itemset mining methods, Mining various kinds of association rules, From Association mining to

correlation analysis.

UNIT 3: CLASSIFICATION AND PREDICTION

Teaching Hours :10

Issues regarding Classification and Prediction, Classification by Decision Tree induction, Bayesian Classification, rule based Classification.

UNIT 4: CLUSTER ANALYSIS

Teaching Hours :10

Types of Data in cluster analysis, Major clustering methods-Portioning methods, Hierarchical methods, Density based methods.

UNIT 5: MINING DIFFERENT TYPES OF DATA

Teaching Hours :10

Data streams, Time-Series data, Sequence patterns in Transaction Databases, Biological data, Spatial data mining, Multimedia, text mining, WWW. Data Mining Application- Retail, Financial, Telecommunication, Biological, Visual and Audio.

Essential Text Books:

1. Jiawei Han and Micheline Kamber: *Data Mining-Concepts and Techniques*, 2/e, 4th reprint 2009.
2. Berson Alex, Stephen J Smith, *Data Warehousing, Data Mining and OLAP*, TATA McGraw-Hill, 13th reprint 2008.

Reference Text Books:

1. Soumendra Mohanty, *Data Warehousing design,development and Best practices*, TATA McGraw-Hill, 4th reprint 2007.

6BJ2EET: ADVANCED JAVA

Total Teaching Hours : 52

No. Of Lecture
Hours/Week : 04

Max Marks : 70

Course Objective:

J2EE is a widely used Framework in Software Development. The objective of the course is to enable the student to gain mastery in various advanced J2EE patterns used in Software Industry. On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

Course Outcome:

- Students are able to develop a dynamic webpage by the use of servlet.
- Students will be able to write a server side java application called Servlet.
- update and delete operations on DBMS table.
- Students will be able to write a server side java application called JSP.
- Use fundamental skills to maintain web server services required to host a website.

UNIT 1: Introduction of J2EE

Teaching Hours :14

Introduction to Enterprise Edition, J2EE Overview, J2EE Architecture, J2EE platform overview, J2EE platform Benefits, J2EE Application Scenarios, Multitier Application Scenario, Stand-Alone Client Scenario, Web-Centric Application Scenario Business-to-Business Scenario , J2EE Components, Containers and Connectors, J2EE Modules, Packaging and Deploying J2EE Applications, web server and application server.

UNIT 2: JDBC

Teaching Hours :06

The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.

UNIT 3: Java Servlet Technology	Teaching Hours :16
Introduction to Servlet, CGI vs Servlet, Servlet Life Cycle, Servlet Application Architecture, Generic Servlet, HTTP Servlet, Handling Client Request: Form Data,, Http Requests and Responses, Handling Client Request: HTTP Request Headers, HTTP Status codes, HTTP Response Headers, Handling Cookies, Session Tracking	
UNIT 4: Java Server Pages (JSP)	Teaching Hours :12
Introduction to JSP Technology, Benefits of JSP, Advantages of JSP over other technologies, comparing servlets and JSP, JSP Architecture, JSP life cycle, Basic syntax, Invoking java code with JSP scripting elements,JSP page directive and Include directive, Scripting elements, JSP Standard action elements, JSP Implicit Objects.	
UNIT 5: Enterprise Java Beans	Teaching Hours : 04
Enterprise java Beans; EJB Architecture Session Java Bean, Entity Java Bean; Message-Driven Bean;	
Essential Text Books:	
1. Designing Enterprise Applications with the J2EETM Platform, Second Edition Inderjeet Singh, Beth Stearns, Mark Johnson, and the Enterprise Team	
Reference Text Books:	
1. The Complete Reference : J2EE by James Keogh from McGraw Hill	

6BCLCMT: CLOUD COMPUTING

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit: 4
Course Objective: <ul style="list-style-type: none">• This course provides an insight into cloud computing• Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.• Cloud Computing fundamental issues, technologies and applications.	
Course Outcome: <ul style="list-style-type: none">• Ability to Understand the concepts of computing paradigms.• Ability to understand the concepts of cloud computing and Deployment Models , various service of a network connectivity and managing cloud• Ability to Understand cloud service providers and the concepts of real time applications.	
UNIT 1: Computing Paradigms	Teaching Hours :10
High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing	
UNIT 2: Cloud Computing Fundamentals	Teaching Hours :10
Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services, Cloud Application, Benefits and Drawbacks	
UNIT 3: Cloud Computing Architecture and Management	Teaching Hours :10
Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud,	

Phases of Cloud Migration Approaches for Cloud Migration.

UNIT 4: Cloud Service Models

Teaching Hours :10

Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT 5: Cloud Service Providers

Teaching Hours :12

EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform.

Essential Text Books:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

Reference Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 20

6BCMSYT: Content Management System

Total Teaching Hours: 52	No. Of Lecture Hours/Week: 04
Max Marks: 70	Credits : 4
Course Objective:	
A content management system (CMS) is an application that is used to manage web content , allowing multiple contributors to create, edit and publish. The objective of the course is to enable the student to gain knowledge about developing their own web sites. On completion of this course, a student will be familiar with client server architecture and able to develop a web application using Content management system tools. Students will gain the skills and project-based experience needed for entry into web site development.	
Course Outcome:	
<ul style="list-style-type: none">• Students are able to develop a dynamic domain based web sites.• Students will be able to develop server side application.• Insert, update and delete operations on Database.	
UNIT 1: INTRODUCTION TO CMS	Teaching Hours :12
What Content Management is (and isn't)?, Points of Comparison, Acquiring a CMS, The Content Management Team, CMS Feature Analysis	
UNIT 2: WORDPRESS	Teaching Hours :10
First Post -What Is WordPress?, Popularity of WordPress, Content and Conversation, Getting Started, Finishing Up Code Overview -downloading, directory and file structure, wordpress configuration, wp-content user playground Working With Wordpress Locally -Benefits of Working Locally, Tools for Component Administration, Configuration Details, Deploying Local Changes	
UNIT 3: DRUPAL	Teaching Hours 10
Introduction to Drupal -Content Management Systems, Creating Content Creating and Managing Content -Understanding the Basics, Creating Content in Drupal, Editing Content, Other Content Options, Deleting Content, Finding Content Creating and Managing Users - Users, Roles, and Permissions, User Accounts, Configuring User Account Settings, Creating Roles, Assigning Permissions, Creating User Accounts, User Generated Accounts	

UNIT 4: MENUS, THEMES, BLOCKS	Teaching Hours :10
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Creating Menus- Ordering From the Menu, Adding an Item to a Menu, Creating a New Menu

Installing Themes- How a Drupal Theme Works, Finding a New Theme, Installing a Theme, The Administration Theme, Configuration Options

Drupal Blocks-Blocks, Blocks, and More Blocks, Making Blocks Appear on Pages, Finding the List of Available Blocks, Reassigning and Deactivating Blocks, Configuring Blocks, Using Blocks from Contributed Modules, Creating Custom Blocks

UNIT 5: MODULES	Teaching Hours :10
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Drupal Modules-Contributed Modules, How to Download, Install, and Configure a Module, Configuring Modules and Setting Permissions, Enabling Other Modules, The Top Eleven Modules

Enabling Interactive Capabilities- Blogging, Forums, Polls

Content Types- The Basic Page and Article Content Types, Defining a Custom Content Type, Creating a Custom Content Type, Other Field Types

Essential Text Book:

1. Deane Barker, "Web Content Management: Systems, Features, and Best Practices", O'Reilly Media, Inc., 1st Edition, 2016, ISBN 978-1-4919-0812-9
2. Todd Tomlinson," Beginning Drupal 7",1st Edition, Apress Publishing Company, ISBN-13 (pbk): 978-1-4302-2859-2

Reference Text Books:

1. Brad Williams, David Damstra, Hai Stern," Professional WordPress: Design and Development", 3rd Edition, 2015, Wrox Publications, ISBN: 978-1-118-98724-7

6BNWSCT: NETWORK SECURITY & CRYPTOGRAPHY

Total Teaching Hours : 52

No. Of Lecture
Hours/Week:4

Max Marks:70

Credit: 04

Course Objective:

- To make the students learn the principles and practices of Cryptography, Network Security and to enable the students understand the various methods of encryption and authentication
- To help them identify the application of these techniques for providing Network and System Security.
- To understanding of key encryption techniques.

Course Outcome:

Student able to describe

- Network services and mechanism
- Symmetrical and asymmetrical cryptography
- Digital integrity, authentication and digital signatures

UNIT 1: Concepts Of Security

Teaching Hours :10

Introduction: Security Goals, Cryptographic Attacks, Services and Mechanism, Techniques. Mathematics of Cryptography: Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence.

UNIT 2: Classification Encryption Technique And Public Key Cryptography

Teaching Hours :10

Traditional Symmetric-Key Ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers. Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Security of DES, Multiple DES, Examples of Block Ciphers influenced by DES. Advanced Encryption Standard: Introduction, Transformations, Key Expansion, The AES Ciphers, Examples, Analysis of AES.

UNIT 3: Cryptographic Hash	Teaching Hours :10
Encipherment using Modern Symmetric-Key Ciphers: Use of Modern Block Ciphers, Use of Stream Ciphers, Other Issues. Mathematics of Asymmetric-Key Cryptography: Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm. Asymmetric Key Cryptography: Introduction, RSA Cryptosystem, Rabin Cryptosystem, Elgamal Cryptosystem, Elliptic Curve Cryptosystems	
UNIT 4: Digital Signature	Teaching Hours :12
Cryptography Hash Functions: Introduction, Description of MD Hash Family, Whirlpool, SHA-512.	
Digital Signature: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Schemes, Variations and Applications. Key Management: Symmetric-Key Distribution, Kerberos, Symmetric-Key Agreement, Public-Key Distribution, Hijacking.	
UNIT 5: Network And Internet Security	Teaching Hours :10
Security at the Application Layer: PGP and S/MIME: Email, PGP, S/MIME. Security at the Transport Layer: SSL and TLS: SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security. Security at the Network Layer: IPsec: Two modes, Two security protocols, Security association, security policy, Internet Key exchange, ISAKMP.	
Essential Textbooks:	
1. William Stallings, <i>Cryptography and Network Security</i> , Prentice Hall, 5th Edition, 2010.	
Reference Text Books:	
1. Atul Kahate, <i>Cryptography and Network Security</i> , Tata McGraw-Hills, 8th Reprint, 2006. 2. Brijendra Singh, <i>Network Security and Management</i> , PHI, 3rd Edition, 2013 3. Eric Maiwald, <i>Information Security Series, Fundamental of Network security</i> , Dreamtech press 2004. 4. Charlie Kaufman, Radia Perlman, Mike Speciner, <i>Network Security: Private communication in the public world</i> , Prentice Hall, 2002.	