Curriculum for Academic year 2018 – 19

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER OBE
for the Candidates admitted from the year 2018-2019

Sem	Course Code	Part	Courses	Hour	Credit	Marks		
						Int. Marks	Ext. Marks	Total Marks
I	18U1LT01	I	Tamil-I	4	3	25	75	100
	18U1LE01	II	English I	4	3	25	75	100
	18U1CTC01	IV	Core – I Digital Computer Fundamentals & C Programming	5	5	25	75	100
	18U1CTCP01	IV	Core Lab I – Problem Solving and C Programming Lab	5	3	40	60	100
	18U1MAA03	III	Allied-I Numerical Methods	4	4	25	75	100
	18U1CTC02	IV	Core-II - Basics of Hardware	4	3	25	75	100
	18U1VE01		Value Education	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**190**	**510**	**700**
II	18U2LT02	I	Tamil-II	4	3	25	75	100
	18U2LE02	II	English-II	4	3	25	75	100
	18U2CTC03	IV	Core III – Data Structures &Algorithms	4	3	25	75	100
	18U2CTCP02	IV	Core Lab II – Data Structures Lab	4	3	40	60	100
	18U2CTC04	IV	Core IV –Programming in C++	4	3	40	60	100
	18U2MAA06	III	Allied- II Discrete Mathematics	4	4	25	75	100
	18U2ES01		Environmental Studies	4	4	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**205**	**495**	**700**
III	18U3CTC05	IV	Core V- Microprocessor and Computer Architecture	4	3	25	75	100
	18U3CTC06	IV	Core VI- Java Programming	4	3	25	75	100
	18U3CTC07	IV	Core VII- Relational Database Management Systems	5	5	25	75	100
	18U3CTCP03	IV	Core Lab III - RDBMS Lab	5	3	40	60	100
	18U3MAA14	IV	Allied- III Resource Management Techniques-I	4	4	25	75	100
	18U3CTCP04	IV	Core Lab IV – Java Programming Lab	4	3	40	60	100
	18U3CTS01	VII	SBEC-I – Office Package	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**205**	**495**	**700**
IV	18U4CTC08	IV	Core VIII-Computer Networks	4	3	25	75	100
	18U4CTC09	IV	Core IX- Operating Systems	4	3	25	75	100
	18U4CTC10	IV	Core-X- Dot net Programming	5	5	25	75	100
	18U4CTCP05	IV	Core Lab V- Dot net Programming Lab	5	3	40	60	100
	18U4CMA04	III	Allied-IV Cost and Management Accounting	4	4	25	75	100
	18U4CTC11	IV	Core XI - Multimedia Design and Applications (DTP Package & Corel Draw)	4	3	25	75	100
	18U4CTS02	VII	SBEC-II (Basics of Unix and Linux)	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**190**	**510**	**700**

V	18U5CTC12	IV	Core-XII Web Technology	5	5	25	75	100
	18U5CTC13	IV	Core-XIII Software Engineering	5	5	25	75	100
	18U5CTC14	IV	Core-XIV Data Mining and Data Warehousing	5	3	25	75	100
	18U5CTE__	V	Elective –I	4	3	25	75	100
	18U5CTCP05	IV	Core Lab VI- Web Technology Lab	4	3	40	60	100
			NMEC - I	2	2	25	75	100
	18U5CTS03	VII	SBEC-III (Computer installation and Servicing))	2	2	25	75	100
			Library / Sports	**1**	**-**	**-**	**-**	**-**
			Mini Project	**2**	**1**	**40**	**60**	**100**
	TOTAL			**30**	**24**	**230**	**570**	**800**
VI	18U6CTC15	IV	Core-XV Computer Graphics & Multimedia	5	5	25	75	100
	18U6CTC16	V	Core – XVI Java & J2EE	5	5	25	75	100
	18U6CTE__	V	Elective –II	4	3	25	75	100
	18U6CTCP06	V	Core Lab VII- Graphics & Multimedia Lab	5	3	40	60	100
	18U6CTCP07	IV	Core Lab VIII - Java & J2EE Lab	5	3	40	60	100
			NMEC-II	2	2	25	75	100
	18U6CTS04	VII	SBEC-IV (Internet of Things)	2	2	25	75	100
	18U6EX01		Extension Activities	1	1	-	-	-
			Library / Sports	1	-	-	-	-
	TOTAL			**30**	**24**	**205**	**495**	**700**
GRAND TOTAL				**180**	**140**	**1225**	**3075**	**4300**

ELECTIVE COURSES

ELECTIVE – I

Semester	Course Code	Course Name
V	17U5CTE01	Web Services
V	17U5CTE02	Soft Computing
V	17U5CTE03	Big Data Analytics

ELECTIVE – II

Semester	Course Code	Course Name
VI	17U6CTE04	Open Source Technologies
VI	17U6CTE05	Artificial Intelligence and Expert Systems
VI	17U6CTE06	Network Security & Cryptography

SEMESTER |I

Subject Title	**Digital Computer Fundamentals and C Programming**	**Semester**	**I**	**Hours :60**
Subject Code	**18U1CTC01**	**Specialization**	**NA**	
Type	**Core –I**	**L:T:P:C**	**5 : 0 : 0 : 5**	

COURSE OBJECTIVE

On successful completion of this subject the students to understand the basics of digital computer and the programming ability in C language.

COURSE OUTCOMES

CO1	**K1**	To Understand the basics components of digital computer and the numerical values in various number systems and perform number conversions between different number systems.
CO2	**K2**	To understand the number system and Illustrate the operation of logic gates using Boolean algebra
CO3	**K1**	To Understand the basic concept of C Programming
CO4	**K3 & K4**	To Develop Programs using Branching and Looping statements, Usage of arrays and Functions
CO5	**K3& K4**	To Explore the concept of pointers, structures, unions and files in C

Unit	Syllabus Contents	Number of Sessions
I	Electronic Digital Computers – Applications of computers – Basic components of Digital computers – Construction of Memory – Assembly languages – High level languages – Decimal system – Binary system – Octal System – Hexadecimal System – Binary addition – Subtraction – Conversions: Binary to decimal – decimal to binary – Binary number complements.	**12**
II	Boolean Algebra and Gate networks: Design using AND - OR - NAND – NOR Gates – Complementation and inverters – Basic laws of Boolean algebra – DeMorgan's theorem – Sum of Products – Products of Sum - Construction of ALU.	**12**
III	Overview of C: Introduction – Basic structure of C programs – Character set – C Tokens – Keywords & Identifiers – Constant – Variables – Data types – Assigning values to variables – Defining symbolic constant – Operators & expressions – Type conversions in expressions – Managing Input & Output Operations.	**12**
IV	Decision Making & Branching Statements: IF – IF-else – Nesting of IF-else – Switch – GOTO Statement. Looping Statement: While – Do..While statement – For statement. Arrays: Definition & Declaration – Types of arrays – Declaring & Initialing string variables – String handling functions. User defined function: Introduction – Definition of function – Function calls – Function declarations & Return types – Recursion.	**12**
V	Structures & Unions: Defining a structure – Declaring structure variables – Accessing structure members – structure Initialization. Unions. Pointers: Introduction – Understanding pointers – Accessing the address of a variable – Initializing of pointer variables. File Management: Introduction - Defining & Opening a file – Closing a file – Input / Output Operation on files.	**12**

Learning Resources	
Text Books	1."Digital Computer Fundamentals" Thomas C Bartee, 6th Edition.T.M.H Publisher, New Delhi, 2008. 2."Programming in ANSI C , E. Balagurusamy Tata MC Graw hill, New Delhi, 6th Edition.
Reference Books	1.M. M. Mano and C.R.Kime, 2001, Logic and Computer Design Fundamentals, 2nd Edn, Pearson Education, Delhi. 2.Givone, 2002, Digital Principles Design, Tata McGraw Hill, New Delhi. 3.M.Morris Mano, "Digital Logic and Computer Design", PHI Publications, New Delhi, 2008.
Web Sites / Links	1.https://www.tutorialspoint.com/computer_fundamentals/computer_overview.html 2.http://www.cprogramming.com

MAPPING WITH PROGRAM OUTCOMES

PSO / CO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓	✓	
CO2	✓	✓	✓	✓
CO3	✓	✓	✓	✓
CO4	✓	✓	✓	✓
CO5	✓	✓	✓	✓
CO6	✓	✓	✓	✓

Subject Title	PROBLEM SOLVING AND C PROGRAMMING LAB	Semester	I
Subject Code	18U1CTCP01	Specialization	NA
Type	CORE – I P – I – Practical	L:T:P:C	0:0:5:3

COURSE OBJECTIVES

1. To understand the logic for each problem.
2. To understand and write the Programming language in C.
3. To Know and write the C Programs for the logics.

COURSE OUTCOMES

CO1	**K1**	To Design algorithms for the given problem specifications.
CO2	**K2**	To Develop C programs for the designed algorithm specification.
CO3	**K3&K4**	To Implement control and looping statements in real time applications
CO4	**K3&K4**	To Apply the concept of arrays and functions to solve the real time problems
CO5	**K3 K4**	To Apply the structure and file concepts

LIST OF PROGRAMS

1. In an Olympic competition the distance to be covered by the athlete player is given in meters. Develop an algorithm and write a C program to convert it into kilometers, yards and miles.
2. Sita went to the departmental stores and purchased two items. For what amount she had purchased and what is the average amount she had spend in the store.
3. What do we call a year that has 366 days? Find the current year and what type of year it is.
4. Thiru is working in reputed company and his basic salary is 40000.Calculate his gross salary based upon his HRA, Provident fund and DA as given values.
5. In Namakkal, today's temperature is 36 °C. What will be its equivalent Fahrenheit vice versa?
6. In our house we want to dig a well. The radius of circle is planned to be 30 meters. What will be the area and perimeter of the well?
7. In a class there are 10 students. As a class advisor I want to split them into two groups. How I will be splitting.
8. In a online application, there is only single box mentioned for the gender category. On printing the application the gender category should be like "Male" or "Female".

9. In our college, there is a digital display screen. To welcome the first year students "Hearty Welcome to New Comers" to be displayed on the digital screen and using function also.
10. The Address of my house is No 174, Vivekananda Street. Find my door number using Pointer Concept.
11. In your company, you want to view your employee's details. How will you view the employee records using structure concept.
12. Program to create a text file using file handling.

MAPPING WITH PROGRAM OUTCOMES

CO/PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓	✓	✓	✓
CO3	✓	✓	✓	✓
CO4	✓	✓	✓	✓
CO5	✓	✓	✓	✓

Subject Title	BASICS OF HARDWARE	Semester	Hours :50
Subject Code	18U1CTC02	Specialization	NA
Type	Core -II	L:T:P:C	4 : 0 : 0 : 3

COURSE OBJECTIVES

- To study about the hardware components of a computer system
- To assemble and disassemble the system hardware components of the personal computer.

COURSE OUTCOMES

CO1	**K1**	To Recall the major components of PC.
CO2	**K2**	To Classify the RAM Technologies.
CO3	**K1**	To Understand the History of Computer and Types of RAM.
CO4	**K3 & K4**	To understand the concept of Motherboard and BIOS
CO5	**K3& K4**	Installation of Zip drive, Hard Drive, Hard Drive Maintenance And Troubleshooting and Understand CD Media Technologies.

Unit	Syllabus Contents	Number of Sessions
I	Introduction – A short history of Computers-Identifying the Major components of a PC-Identifying the internal components of a PC-CPU-RAM-Types of RAM Technologies-RAM Packages- Adding and Upgrading RAM.	10
II	Motherboards and BIOS- Common motherboard features-Types of Motherboards-Installing the Motherboard-The System BIOS-Expansion Buses-Internal Buses-Installing a Plug and Play Expansion Card-External Expansion Buses :USB and FireWire.	10
III	Power Supplies and Cases-Case Form and Function-Power supply-Cooling-Identifying Installing and troubleshooting-Identifying, Installing and Troubleshooting-Identifying and Installing Zip drives.	10
IV	Hard Drives-How Hard Drives store data-Installing a Hard Drive-Configuring a Hard Drive-Hard Drive Maintenance and Troubleshooting	10
V	Understanding CD Media Technologies-Input Devices- Installing a keyboard-Installing and Configuring a mouse-Identifying Less Common Input Devices-Printers-Identifying current Printer Technologies.	10

Learning Resources	
Text Books	1.Mike Meyers " Introduction to PC Hardware and Troubleshooting".
Reference Books	1. Cisco Networking Academy "IT Essentials : PC Hardware and Software Companion Guide" Fifth edition . 2. Ron Gilster "PC Hardware A Beginner's Guide" .Tata McGraw –Hill Edition. 3. K.L.James " Computer Hardware Installation ,Interfacing Trouble Shooting and Maintenance PHI Learing Private Limited Delhi -2013.
Web Sites / Links	1. http://www.ce.ucf.edu/

MAPPING WITH PROGRAM OUTCOMES

CO/PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓	✓	✓
CO2	✓	✓		✓
CO3	✓	✓	✓	
CO4	✓		✓	✓
CO5	✓		✓	✓

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN [AUTONOMOUS]

ELAYAMPALAYAM, TIRUCHENGODE - 637 205.

PG and RESEARCH DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

B.Sc. COMPUTER TECHNOLOGY

Curriculum for Academic year 2018 – 19

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER CBCS & OBE PATTERN

for the Candidates admitted from the year 2018-2019

Sem	Course Code	Part	Courses	Hour	Credit	Marks		
						Int. Marks	Ext. Marks	Total Marks
I	18U1LT01	I	Tamil-I	6	3	25	75	100
	17U1LE01B	II	English I	6	3	25	75	100
	18U1CTC01	IV	Core – I Digital Computer Fundamentals & C Programming	4	5	25	75	100
	18U1CTCP01	IV	Core Lab I – Problem Solving and C Programming Lab	4	3	40	60	100
	18U1MAA03	III	Allied-I Numerical Methods	4	4	25	75	100
	18U1CTC02	IV	Core-II - Basics of Hardware	4	3	25	75	100
	17U1VE01		Value Education	2	2	25	75	100
	TOTAL			**30**	**23**	**190**	**510**	**700**
II	18U2LT02	I	Tamil-II	6	3	25	75	100
	18U2LE02	II	English-II	6	3	25	75	100
	18U2CTC03	IV	Core III –Programming in C++	5	5	25	75	100
	18U2CTCP02	IV	Core Lab II – C++ Programming Lab	5	4	40	60	100
	18U2MAA06	III	Allied- II Discrete Mathematics	4	4	25	75	100
	18U2ES01		Environmental Studies	4	4	25	75	100
	TOTAL			**30**	**23**	**165**	**435**	**600**
	18U3CTC04	IV	Core IV – Data Structures &Algorithms	4	3	25	75	100
	18U3CTC05	IV	Core V- Java Programming	4	3	25	75	100
	18U3CTC06	IV	Core VI- Relational Database Management Systems	4	3	25	75	100

III	18U3CTCP03	IV	Core Lab III - RDBMS Lab	4	3	40	60	100
	18U3MAA10	III	Allied- III Resource Management Techniques-I	4	4	25	75	100
	18U3CTCP04	IV	Core Lab IV – Java Programming Lab	4	3	40	60	100
	18U3CTS01	VII	SBEC-I – Office Package	2	2	25	75	100
		VI	NMEC-I (Quantitative Aptitude)	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**230**	**570**	**800**
IV	18U4CTC07	IV	Core VII Microprocessor and Computer Architecture	4	3	25	75	100
	18U4CTC08	IV	Core VIII-Computer Networks	4	3	25	75	100
	18U4CTC09	IV	Core IX- Operating Systems	4	3	25	75	100
	18U4CTC10	IV	Core-X- Dot net Programming	4	3	25	75	100
	18U4CTCP05	IV	Core Lab V- Dot net Programming Lab	4	3	40	60	100
	18U4CMA04	III	Allied-IV Cost and Management Accounting	4	4	25	75	100
	18U4CTS02	VII	SBEC-II (Basics of Unix and Linux)	2	2	25	75	100
		VI	NMEC-II	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**215**	**585**	**800**

V	18U5CTC11	IV	Core-XI Web Technology	5	5	25	75	100
	18U5CTC12	IV	Core-XII Software Engineering	5	5	25	75	100
	18U5CTC13	IV	Core-XIII Data Mining and Data Warehousing	5	3	25	75	100
	18U5CTE__	V	Elective –I	4	3	25	75	100
	18U5CTCP05	IV	Core Lab VI- Web Technology Lab	4	3	40	60	100
	18U5CTC14	IV	Core - XVI PHP Programming	2	2	25	75	100
	18U5CTS03	VII	SBEC-III PHP Programming Lab	2	2	25	75	100
			Library / Sports	**1**	**-**	**-**	**-**	**-**
			Mini Project	**2**	**1**	**40**	**60**	**100**
	TOTAL			**30**	**24**	**230**	**570**	**800**
VI	18U6CTC15	IV	Core-XV Computer Graphics & Multimedia	5	5	25	75	100
	18U6CTC16	IV	Core – XVI Java & J2EE	5	5	25	75	100
	18U6CTE__	V	Elective –II	4	3	25	75	100
	18U6CTCP06	IV	Core Lab VII- Graphics & Multimedia Lab	5	3	40	60	100
	18U6CTCP07	IV	Core Lab VIII - Java & J2EE Lab	5	3	40	60	100
	18U5CTC17	IV	Core –XVII -Computer Installation and Servicing	2	2	25	75	100
	18U6CTS04	VII	SBEC-IV (Internet of Things)	2	2	25	75	100
	18U6EX01		Extension Activities	1	1	-	-	-
			Library / Sports	1	-	-	-	-
	TOTAL			**30**	**24**	**205**	**495**	**700**
GRAND TOTAL				**180**	**140**	**1235**	**3165**	**4400**

ELECTIVE COURSES

ELECTIVE – I

Semester	Course Code	Course Name
V	18U5CTE01	Web Services
V	18U5CTE02	Soft Computing
V	18U5CTE03	Big Data Analytics

ELECTIVE – II

Semester	Course Code	Course Name
VI	18U6CTE04	Open Source Technologies
VI	18U6CTE05	Artificial Intelligence and Expert Systems
VI	18U6CTE06	Network Security & Cryptography

B.Sc. COMPUTER TECHNOLOGY

PROGRAM SPECIFIC OUTCOMES

After completion of the programme the graduates will be able to

PSO1: To understand the fundamental concepts of computer system, including hardware and networking.

PSO2: To Design, and analyze precise specifications of algorithms, procedures, and interaction behavior.

PSO3: Ability to communicate effectively in both verbal and written form in industry and society.

PSO4: Apply the technologies in various fields of Computer Technology including Fundamentals of Digital Computer, Microprocessor, Relational Database Management System, Computer Networks, Multimedia Design and Applications and Web Technology etc.

MAPPING OF PEO'S AND PO'S

PSO/PO	PO1	PO2
PSO1	✓	
PSO2	✓	
PSO3	✓	✓
PSO4	✓	✓

Subject Title	Data Structures and Algorithms	Semester	III
Subject Code	18U3CTC04	Specialization	NA
Type	Core-IV Theory	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- Understand and remember algorithms and its analysis procedure.
- Introduce the concept of data structures through ADT including List, Stack, Queues.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Explain the organization and operations of data structures Stack, Queues, Trees, Graphs, Heaps.	K5
CO2	Compare and contrast the functionalities and applications of different data structures	K2
CO3	Demonstrate specific search and sort algorithms using data structures given specific user requirements	K1
CO4	Apply the operations of data structures in designing software procedures based on specific requirements	K3
CO5	Assess the applicability of given data structures and associated operations to real time	K2
CO6	Identify suitable algorithms with appropriate data structures for real time software Requirements Computer applications	K3
CO7	Modify the existing operations of data structures for changing needs of the software requirements	K6

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction and Overview:** Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures. **Arrays:** Definition – Terminology – One Dimensional Array – Multidimensional Array – Applications.	K3	12
II	**Linked List:** Definition – Single Linked List – Representation – Operations – Double Linked List – Operations. **Stacks:** Introduction – Definition – Representation of stacks – Operations on Stacks – Applications of Stack: Evaluation of Arithmetic Expression. **Queues:** Introduction -Definition- Representation of Queues – Applications of Queues: CPU Scheduling in a Multiprogramming Environment – Round Robin Algorithm.	K4	15
III	**Trees:** Basic Terminologies-Definition and Concepts – Representation of Binary tree – Operations on Binary Tree: insertion – Deletion – Tree Traversals – Types of Binary Trees: Expression tree – Binary Search Tree – Heap Trees.	K4	12
IV	**Sorting:** Basic Terminologies- Sorting Techniques- Sorting by Selection: Heap Sort-Sorting by Exchange: Bubble Sort - Quick Sort- Shell Sort-Sorting by Distribution: Radix Sort- Sorting by Merge: Merge Sort - Space and Time Complexity.	K3	12
V	**Graphs**-Introduction-Graph Terminologies-Representation of Graphs-Operations on Linked List Representation of Graphs-Applications: Shortest Path Problem.	K3	12

Learning Resources	
Text Books	1. Debasis Samanta "Classical Data structure" 2nd Edition, PHI Learning Private Limited, New Delhi, 2011.(UNIT I-V)
Reference Books	1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education Asia, 2009. 2. Alfred V. Aho, Murray Hill, John E. Hopcroft, Jeffrey D. Ullman, " Data Structures and Algorithms".3 rd Edition, Pearson Education,2008.
Web Sites / Links	1. www.freetechbooks.com/algorithms-and-data-structures-f11.html

Pedagogy : Chalk and Talk, PPT ……

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3	✓	✓		✓
CO4	✓		✓	
CO5	✓		✓	✓
CO6		✓		
CO7	✓		✓	✓

Subject Title	Java Programming	Semester	III
Subject Code	18U3CTC05	Specialization	NA
Type	Core-V Theory	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- To know how to program in the Java programming language,
- To develop knowledge of object-oriented paradigm in the Java programming language,
- Apply and use of Java in a variety of technologies and on different platforms.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand and write the program in Java with basic input and output functions	K2
CO2	To understand the functions, Class and Objects, Inheritance and Packages in Java	K3
CO3	To understand and apply the exception handling mechanisms in Java	K3
CO4	To know the concept of JDBC and apply in the program to connect with the Java Program	K4
CO5	To know and develop Applets and know its use	K3

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction - Object Oriented Programming - History of Java – Byte Code – A first Simple program – **I/O Basis** : Reading / Writing Console Input / Output – Lexical Issues – Java Data types – Variables – Type Conversion and Casting – Arrays – Operators – Control Statements.	**K3**	**15**
II	**Classes and Objects:** A Simple Class and Declaring Objects, Methods – Examples – Constructor's – Inheritance – Basics – Using super - Creating a Multilevel Hierarchy – **Packages and Interfaces:** Packages – Access Protection – Importing Packages – Interfaces.	**K3**	**15**
III	**Exception Handling:** Fundamentals – Types – Using try and catch – Built in Exceptions – Throwing our own Exception .**Introducing AWT:** AWT classes – Windows fundamentals - Working with frame windows – Working with graphics – Control fundamentals – Labels – Buttons – Text Field.	**K3**	**15**
IV	**Database programming:** The Design of JDBC – JDBC Driver types – Uses of JDBC – SQL – Connecting to the database – Executing SQL – Statements – Managing Connections – Statements and Result sets – SQL Exception. The Applet Class-types of Applet- Basics-Applet Class – Architecture – An applet Skeleton - Applet Initialization and Termination- Overriding update( )	**K4**	**15**
V	Simple Applet Display Methods -Requesting Repainting -A Simple Banner Applet -Using the Status Window -The HTML APPLET Tag -Passing Parameters to Applets -Improving the Banner Applet -getDocumentBase( ) and getCodeBase( ) -AppletContext and showDocument( ) -The AudioClip Interface -The AppletStub Interface-Outputting to the Console	**K3**	**15**

Learning Resources	
Text Books	1. Herbert Schildt , The Complete Reference Java II,5th Edition , TATA Mc Graw-Hill 2002. 2. Cays.Hortmann hary cornell, Core Java Volume II – Advanced Features, Pearson education 2010.
Reference Books	1. Deital Deital "Java How to Program" Pearson Education,2005 2. Rashmi kanta Das "Core Java: For Beginners, Vikas Publishing Pvt Ltd,2009. 3. Martin *Rinchart*, "Java database development", Tata Mcgraw Hill 2000.
Web Sites / Links	1. www.csee.umbc.edu/courses/331/spring03/0101/lectures/java02.ppt 2. www.slideshare.net/intelligotech/java-tutorial-ppt-7189933

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓		✓	
CO2			✓	
CO3	✓			✓
CO4			✓	
CO5	✓		✓	✓

Subject Title	**Relational Database Management Systems**	**Semester**	**III**
Subject Code	**18U3CTC06**	**Specialization**	**NA**
Type	**Core –VI Theory**	**L:T:P:C**	**4:0:0:3**

COURSE OBJECTIVE

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To understand the internal storage structures, this will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing techniques

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To know and understand about the data Management Components and about the Entity Relational Entity Model	**K5**
CO2	To know and apply the SQL Commands and tables	**K2**
CO3	Apply and evaluate the different table commands like DML, DDL.	**K1**
CO4	To know and apply the PL/SQL commands and familiarize	**K3**
CO5	To understand the Composite Data types used in PL/SQL	**K2**

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction to DBMS: Information – Data and Data Management – Characteristics of a data in a database –– Functions of DBMS – Components of DBMS – data dictionary. Data Base Architecture and Design: Introduction – Data base architecture – data abstraction. Entity –Relationship Modeling: Introduction – ER Model – Components of ER model – Relationships: Degree-Connectivity-Cardinality– ER modeling symbols. Data Normalization: -1NF-2NF-3NF-BCNF-4NF-5NF– Denormalization.	K3	15
II	Oracle9*i*: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - *i*SQL *Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.	K3	16
III	Working with Table: Data Management and Retrieval: DML – Adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records –Retrieving Data from Table – Arithmetic Operations – Restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.	K4	16
IV	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	K4	16
V	PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages –Triggers – Data Dictionary Views.	K3	12

Pedagogy: Chalk and Talk, PPT …….

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2			✓	
CO3	✓	✓		✓
CO4			✓	
CO5	✓			✓

Subject Title	RDBMS LAB	Semester	III
Subject Code	18U3CTCP03	Specialization	NA
Type	CORE LAB – III	L:T:P:C	0:0:4:3

COURSE OBJECTIVE

- To know the basic commands in SQL
- To understand the DML, DDL Statements
- To familiarize in the Data Schemes
- To understand and program in PL/SQL

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To know the DDL,DML statements	**K1**
CO2	To know and apply different types of simple queries	**K3**
CO3	To work with different data schemas	**K3**
CO4	To know and familiarize in PL/SQL programs	**K3**
CO5	Understand, appreciate and effectively explain the underlying concepts of database technologies	**K4**

List of Programs	
1	Basic SQL Queries
2	Simple Queries using built in functions.
3	Simple Queries Using set operations.
4	Database Schema for a customer-sale scenario Customer (Cust id : integer, cust_name: string) Item (item_id: integer, item_name: string, price: integer) Sale (bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer) For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List all the bills for the current date with the customer names and item numbers. d. List the details of the customer who have bought a product which has a price>200
5	Database Schema for a Student Library scenario Student(Stud_no : integer, Stud_name: string) Membership (Mem_no: integer, Stud_no: integer) Book (book_no: integer, book_name:string, author: string) Iss_rec(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer) For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List all the student names with their membership numbers d. List all the issues for the current date with student and Book names e. List the details of students who borrowed book whose author is CJDATE
6	For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List the employee details department wise d. List all the employee names who joined after particular date e. List the details of employees whose basic salary is between 10,000 and 20,000
7	Write a PL/SQL program to find largest number from the given three numbers.
8	Write a PL/SQL program to check whether the given number is Armstrong or not
9	Write a PL/SQL program to implement trigger
10	Write a PL/SQL program to implement cursor.

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MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓	✓	✓	✓
CO3	✓			✓
CO4		✓	✓	✓
CO5	✓		✓	✓

Subject Title	Java Programming Lab	Semester	III
Subject Code	18U3CTCP04	Specialization	NA
Type	Core Lab IV	L:T:P:C	0:0:4:3
Subject Title	Java Programming Lab	Semester	III
Subject Code	18U3CTCP04	Specialization	NA
Type	Core Lab IV	L:T:P:C	0:0:4:3

COURSE OBJECTIVE

- Gain knowledge about basic Java language syntax and semantics 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.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem	K3
CO2	Write Java application programs using OOP principles and proper program structuring	K3
CO3	Demonstrate the concepts of polymorphism and Inheritance	K3
CO4	Write Java programs to implement error handling techniques using exception handling	K2
CO5	Understand and Apply the concept of JDBC in there application	K3

List of Programs

13. Write a java program to generate Fibonacci series.
14. Write a java program to display tables from 1 to 10 using 2d Array.
15. Implementation of Classes and Objects concepts.
16. Implementation of Constructor.
17. Write a java program to create user defined exception.
18. Implementation of Interface concept.
19. Implementation of packages in java.
20. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
21. Write a program to implement the concept of Exception Handling using predefined exception.
22. Write a program to implement the concept of Exception Handling by creating user defined exceptions.
23. Write a program using Applet to display a message in the Applet.
24. Write programs for using Graphics class
    - to display basic shapes and fill them
    - draw different items using basic shapes
    - set background and foreground colors.

13. Write a program to establish the connection between Java programs to database.
14. Write a program to create a database table by using Java program.
15. Develop an application to perform insert, update, retrieve and delete the record from the database in JDBC.
16. Write a program to combine data from more than one table in Java.

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2			✓	
CO3	✓	✓		✓
CO4				
CO5	✓		✓	✓

Subject Title	Office Package	Semester	III
Subject Code	18U3CTS01	Specialization	NA
Type	SBEC-I	L:T:P:C	2:0:0:2

COURSE OBJECTIVE

- 0ffice tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- To familiarize the students in preparation of documents and presentations with office automation tools.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Describe the usage of computers and why computers are essential components in business and society.	K3
CO2	Utilize the Internet Web resources and evaluate on-line e-business system.	K3
CO3	Solve common business problems using appropriate Information Technology applications and systems	K4
CO4	To perform presentation skill	K2
CO5	Describe various types of networks network standards and communication software.	K4

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction:** Introduction to MS-Office.MS-word: Introduction to word basics-Commands-Copying and Moving Text-Working with text-Find and Replace-Formatting Text-Mail Merge-Table-Spell Check and Grammar.	K3	5
II	**MS-EXCEL:** Excel Basics-Introduction-Menus-Toolbars-Icons-Opening Excel-Cells-Entering and Editing Data-Creation of Chart-Naming Formulas-Functions.	K3	5
III	**MS-POWERPOINT:** Introduction-Menus-Toolbars-Creating and Editing Slides-Working with PowerPoint.	K4	5
IV	**MS-ACCESS:** Introduction-Starting Microsoft Access-Creating New Database-Opening Existing Database-Access Database Wizards-Tables-Creating Query.	K4	5
V	**MS-OUTLOOK:** Introduction-Menus-Toolbars-Working with Outlook.	K5	5

Learning Resources	
Text Books	1.Sanjay Saxena,"MS-OFFICE 2000 for Everyone", Vikas Pub.House, NewDelhi. (Part-II, III, IV, V, VI& IX).
Reference Books	1. Joyce Cox, Joan Lambert, and Curtis Frye "Microsoft Step by Step ,Microsoft office Professional 2010", First Edition,2010
Web Sites / Links	1.https://en.wikipedia.org/wiki/Microsoft_Office

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MAPPING WITH PROGRAM OUTCOMES

'CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		✓
CO2			✓	
CO3	✓	✓		✓
CO4		✓		
CO5	✓		✓	✓

Subject Title	Microprocessor and Computer Architecture	Semester	IV
Subject Code	18U4CTC07	Specialization	NA
Type	Core - VII	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- To enable the students with the understanding of basic computer architecture with instruction set and programming of 8085 in particular.
- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
  To learn the different ways of communication with I/O devices.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To study the architecture of 8085 processor	K3
CO2	Understand the basics structure of computers, operations and instructions.	K3
CO3	Design arithmetic and logic unit.	K2
CO4	Understand pipelined execution and design control unit.	K4
CO5	Understand parallel processing architectures.	K2
C06	Understand the various memory systems and I/O communication.	K4

Unit	Syllabus Contents	Levels	Number of Sessions
I	**8085 PROCESSOR**: Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts. **Programming Of 8085 Processor:** Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions.	**K3**	**15**
II	**Basic Structure Of A Computer System :** Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing. **Arithmetic For Computers:** Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism.	**K3**	**15**
III	**PROCESSOR AND CONTROL UNIT:** A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.	**K4**	**12**
IV	**PARALLELISIM:** Parallel processing challenges – Flynn‘s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures – Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors – Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.	**K4**	**15**
V	**MEMORY & I/O SYSTEMS:** Memory Hierarchy – memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB‘s – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits – USB.	**K3**	**12**

Learning Resources	
Text Books	1. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013. 2. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2008.
Reference Books	1. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013. 2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012. 3. N.Senthil Kumar, M.Saravanan, S.Jeevananthan, 'Microprocessors and Microcontrollers', Oxford,2013.
Web Sites / Links	http://www.sathyabamauniversity.ac.in/uploads/notes/note_1455257249.pdf https://www.mediafire.com/file/wk8gzwbtyse84jk/CS6303+notes.pdf

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MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		✓
CO2			✓	
CO3	✓	✓		✓
CO4		✓		
CO5	✓		✓	✓
CO6		✓		✓

Subject Title	Computer Networks	Semester	IV
Subject Code	18U4CTC08	Specialization	NA
Type	Core –VIII Theory	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- To Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To Read the fundamentals and basics of Physical layer, and will apply them in real time applications.
- To Study data link layer concepts, design issues, and protocols.
- To Gain core knowledge of Network layer routing protocols and IP addressing.
- To know about the Session layer design issues, Transport layer services, and protocols.
- To Acquire knowledge of Application layer and Presentation layer paradigms and protocols.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Become familiar with layered communication architectures (OSI and TCP/IP).	**K5**
CO2	To Understand the functionalities of Physical layers.	**K2**
CO3	Design computer networks using sub netting an routing concepts	**K1**
CO4	Understand the various Medium Access Control techniques and also the characteristics of physical layer Functionalities.	**K3**
CO5	To know about the UDP Protocol	**K2**
CO6	To understand about the Session and HTTP Protocol	**K3**

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Data communications** – Components – Data Representation – Direction of Data flow-Networks – Categories – Topologies – **Protocols and Standards** – ISO/OSI Model – Layers in the OSI model – TCP/IP Protocol suite – Addressing.	K2	12
II	**Physical layer and Media:** Analog and Digital – Data rate limits- B**andwidth utilization:** Multiplexing- Spread Spectrum – **Transmission media:** Guided media and unguided media. **Switching:** Circuit switched networks – Virtual circuit networks.	K3	12
III	**Data link layer:** Error Detection and Correction – Types of Errors – Redundancy. Framing – Flow and Error control – Noiseless channels and Noisy channel – **Networking Addresses:** IPV4 – Datagram – Fragmentation – Checksum – options. IPV6 – Advantages – Packet Format – Transition from IPV4 to Ipv6 – Tunneling.	K3	12
IV	**Transport Layer:** UDP – Ports for UDP – User Datagram – checksum – operations – uses .TCP –Services – Features – Segment – Connection – Flow Control – Error Control – SCTP. **Congestion Control:** Open loop – Closed loop – **QOS:** Integrated Services.	K3	12
V	**Presentation Layer:** Protocols – Services. **Session Layer:** Protocols – Services. **Application Layer:** SNMP – DNS – DNS in the Internet – DNS Messages – Types of Records – WWW and HTTP – Web documents – Electronic Mail.	K3	12

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MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1		✓		✓
CO2	✓		✓	
CO3		✓		✓
CO4	✓			
CO5		✓	✓	
CO6	✓	✓		✓

Learning Resources	
Text Books	1. "Data communications and Internetworking ", Behrouz A Forouzan, Fourth Edition, 2006. 2. "Computer Networks",Tannenbaum , Fifth Edition
Reference Books	1. Computer Networking: Principles,Protocols and Practice, Olivier Bonaventure,2011. 2. James F.Kurose and Keith W.ROSS, "Computer Networking: A Top-Down Approach Featuring the Internet", Fifth Edition 2012. 3. Andrew S.Tanenbaum ," Computer Networks", PHI, Fourth Edition , 2008.
Web Sites / Links	1. www.tutorialspoint.com/computer.../computer_networking.htm 2. www.journals.elsevier.com/computer-networks

Subject Title	Operating Systems	Semester	IV
Subject Code	18U4CTC09	Specialization	NA
Type	Core IX Theory	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- To introduce students with basic concepts of Operating System, its functions and services.
- To familiarize the students with various views and management policies adopted by O.S. as pertaining with processes , Deadlock , memory , File and I/O operations.
- To brief the students about functionality of various OS like Unix , Linux and Windows XP as pertaining to resource management.
- To provide the knowledge of basic concepts towards process synchronization and related issues.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Analyze the structure of OS and basic architectural components involved in OS design	K4
CO2	Analyze and design the applications to run in parallel either using process or thread models of different OS	K6
CO3	Analyze the various device and resource management techniques for timesharing and distributed systems	K5
CO4	Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system	K4
CO5	Interpret the mechanisms adopted for file sharing in distributed Applications	K2
CO6	Conceptualize the components involved in designing a contemporary OS	K2

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Operating System Overview**: Operating System Objectives and Functions. History of Operating System: First, Second, Third and Fourth Generation Operating System. **Types of Operating System**: Main Frame – Server – Multiprocessor – Personal Computer – Embedded – Real Time Operating System. The Evolution of Operating System	K3	12
II	**Threads:** Process and Threads – Multithreading – Thread Functionality. **Mutual Exclusion and Synchronization:** Principles of Concurrency – Mutual Exclusion – Semaphores. **Deadlock and Starvation:** Resources – Principles of Deadlock – Deadlock Detection and Recovery – Deadlock Avoidance and Prevention.	K3	12
III	**Memory Management:** Memory Management Requirements – Memory Partitioning – Paging – Segmentation. Virtual Memory: Hardware and Control Structures. **Operating System Software:** Fetch Policy – Placement Policy – Replacement Policy – Basic Algorithms – Page Buffering	K3	12
IV	**Scheduling:** Types of Scheduling - Long Term Scheduling – Medium Term Scheduling – Short - Term Scheduling. **Scheduling Algorithm:** Short Term Scheduling Criteria – The Use of Priorities – Alternative Scheduling Policies. **File Management**: Overview – File Organization and Access – File Sharing – Record Blocking – Secondary Storage Management.	K4	12
V	**I/O Devices-Organization of the I/O Functions**: The Evolution of the I/O function-Direct Memory Access. **I/O Buffering:** Single Buffer-Double Buffer-Circular Buffer-The Utilities of Buffering. **Disk Scheduling**: Disk Performance Parameters-Disk Scheduling Polices-RAID- Case Studies: Windows-Linux-Mac OS.	K3	12

Learning Resources	
Text Books	1."Operating Systems Internals and Design Principles" by William Stallings, Second Edition, PHI Learning Private Limited, New Delhi, 2008.
Reference Books	1."Modern Operating Systems" by Andrew S. Tanenbaum, Third Edition, PHI Learning Private Limited, NewDelhi, 2011. 2."Operating Systems", by Achyut S Godbole, Second Edition, TMH Publishing Company Limited, New Delhi, 2008. 3."Operating System Concepts", by Silberschatz, Galvin and Gagne, Sixth Edition, John Wiley & Sons Inc 2002.
Web Sites / Links	1.http://faculty.salina.k-state.edu/tim/ossg/Introduction/OSrole.html 2.www.tutorialspoint.com/operating_system/

Pedagogy : Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3		✓		✓
CO4	✓		✓	
CO5	✓		✓	✓
CO6	✓	✓		✓

Subject Title	Dot Net Programming	Semester	IV
Subject Code	18U4CTC10	Specialization	NA
Type	Core-XIII Theory	L:T:P:C	4:0:0:3

COURSE OBJECTIVE

- To impart knowledge on web design issues, database connections and techniques for creating dynamic websites using C#.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand C# variables & Datatypes	K3
CO2	Understand & Apply different Conditional Looping Structures	K3
CO3	Understand the different Control Classes	K4
CO4	Understand and apply Validation Controls	K3
CO5	Understand and apply ADO.NET Fundamentals	K3
CO6	Understand & apply Data binding	K3

Unit	Syllabus Contents	Levels	Number of Sessions
I	**C# at Work-** . NET Framework & the CLR –Assemblies- File Extensions used in Visual C#- Visual C# Integrated Development Environment –Data Types in C#.	**K3**	**15**
II	**Arrays & Variables:** Variables –Arrays-User Defined **Data types in C#**: Classes, Inheritance- Methods – Operators –Branching & Looping – Exception Handling – Events.	**K3**	**15**
III	**Visual Elements in C# :**General Components –User Defined Components –Graphics Handling, Web Form Controls – Classes –List Classes – Table Controls & Image Controls – Hyperlinks & Link Buttons.	**K3**	**15**
IV	**Validation:** Validation Controls- Validation Groups, Calendars & Ad Rotators-**HTML controls:** Client & Server HTML controls- HTML Server Control classes- HTML control classes.	**K3**	**15**
V	**Data Access with ADO.NET :** Introduction to Database-SQL Basics –Creating a new Data Connection –Dataset. **Binding controls to database:** Simple, Complex Binding- Binding data to Controls- Navigating in Data- Data Controls: The Grid view- The Details –The Form view.	**K3**	**15**

Learning Resources	
Text Books	1. Matt Teller and Kogent solutions inc " C# 2005 Programming Covers .NET 3.0 and 2.0 Black Book", Dream Tech press,2007.
Reference Books	1. Pro ASP.NET 2.0 in C# 2005-Matthew Macdonald and Mario Szpuszta-Apress 2. C# 2008 for programmers –Third Editon-Deitel developer series:Paul J.Deitel and Harvey M.Deitel :Pearson. 3. Murach's ASP.NET 2.0 web programming C# 2005-Jeel Murach & Anne Boehm:SPD(Shroff publishers & Distributors pvt.Ltd) 4. Beginning ASP.NET 2.0 in C# 2005: From Novice to Professional (Beginning: From Novice to Professional). Matthew MacDonald (Author) publication: APress 2005.
Web Sites / Links	1. www.slideshare.net/ 2. www.powershow.com/

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3		✓		✓
CO4	✓		✓	
CO5	✓		✓	✓
CO6		✓		✓

Subject Title	Dot Net Programming Lab	Semester	V
Subject Code	18U4CTCP05	Specialization	NA
Type	Core Lab -V	L:T:P:C	0:0:4:3

COURSE OBJECTIVE

- Introduce to .Net IDE Component Framework.
- Programming concepts in .Net Framework.
- Creating website using ASP.Net Controls.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand C# variables & Data types	K3
CO2	Understand & Apply different Conditional Looping Structures	K3
CO3	Understand the different Control Classes	K2
CO4	Understand and apply Validation Controls	K3
CO5	Understand and apply ADO.NET Fundamentals	K4
CO6	Understand & apply Data binding	K3

List of Programs

Following On-line Applications using C#.NET.

1. Write a console application that obtains four int values from the user and displays the product.
2. If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?
3. Write an application that includes the logic from Exercise 1, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.
4. Write programs using conditional statements and loops:

   I) Generate Fibonacci series.

   II) Generate various patterns (triangles, diamond and other patterns) with numbers.

   III) Test for prime numbers.

   IV) Write programs using conditional statements and loops: IV) Generate prime numbers.

   V) Write programs using conditional statements and loops: V) Reverse a number and find sum of digits of a number.

   VI) Write programs using conditional statements and loops: V) Test for vowels.

   VII) Write programs using conditional statements and loops: VII) Use of foreach loop with arrays.

5. Write an application that receives the following information from a set of students: Student Id: Student Name: Course Name: Date of Birth: The application should also display the information of all the students once the data is entered. Implement this using an Array of Structures.

6. Write an application that uses two command-line arguments to place values into a string and an integer variable, respectively. Then display these values.
7. Write a program to declare class „Distance" have data members dist1,dist2 ,dist3. Initialize the two data members using constructor and store their addition in third data member using function and display addition.

8. Create an application that allows the user to enter a number in the textbox named „getnum". Check whether the number in the textbox „getnum" is palindrome or not. Print the message accordingly in the label control named lbldisplay when the user clicks on the button „check".

9. Create an application which will ask the user to input his name and a message, display the two items concatenated in a label, and change the format of the label using radio buttons and check boxes for selection , the user can make the label text bold ,underlined or italic and change its color . include buttons to display the message in the label, clear the text boxes and label and exit.

10. List of employees is available in listbox. Write an application to add selected or all records from listbox (assume multi-line property of textbox is true).

11. Database programs with ASP.NET and ADO.NET. Create a Web App to display all the Empname and Deptid of the employee from the database using SQL source control and bind it to GridView . Database fields are(DeptId, DeptName, EmpName, Salary).
12. Database programs with ASP.NET and ADO.NET Create a Login Module which adds Username and Password in the database. Username in the database should be a primary key.
13. Database programs with ASP.NET and ADO.NET Create a web application to insert 3 records inside the SQL database table having following fields (DeptId, DeptName, EmpName, Salary). Update the salary for any one employee and increment it to 15% of the present salary. Perform delete operation on 1 row of the database table.
14. Programs using Language Integrated query. Create the table with the given fields. FIELD NAME DATA TYPE EmpNo number EmpName varchar EmpSal number EmpJob varchar EmpDeptNo number
15. Design the same webpages for BMS, BAF, BscIT students and apply same background color for all the pages using css.
    a. Set the label border color of rollno to red using css.
    b. Set the font-Arial , font style-bond , font size-18px of different controls(ie. Label, textbox, button) using css.
    c. Change the font family and color of all heading of above webpage using css.
    d. Use pseudo classes and display link, visited link and active link of contact us differently.

MAPPING WITH PROGRAM OUTCOMES

CO1	✓	✓		
CO2	✓		✓	
CO3		✓		✓
CO4	✓		✓	
CO5			✓	✓
CO6	✓	✓		

Subject Title	Basics of Unix and Linux	Semester	IV
Subject Code	18U4CTS02	Specialization	NA
Type	SBEC - II	L:T:P:C	2:0:0:2

COURSE OBJECTIVE

- To enable the students to understand the Operating system of UNIX and Linux
- To identify the various commands used the above two Operating System.
- To know and understand the managing of Documents
- To know about the Shell Scripting

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To know about the overview of the internal system	**K5**
CO2	To know and use the Linux Operating System and commands	**K2**
CO3	Understand how to manage the files in Linux	**K1**
CO4	Apply the various commands and manage the files in Linux	**K3**
CO5	Understand the basic files in UNIX	**K2**
CO6	Basic file commands in UNIX	**K3**
CO7	To know about the overview of the internal system	**K5**

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Getting Started**: The Operating System, The UNIX Operating System, Knowing Your Machine- A Brief Session – How it all clicked- Linux & GNU- The UNIX Architecture &Command- Usage- General Purpose Utilities –The file System.	K2	12
II	Handling ordinary Files – Basic File Attributes – Simple Filters – Filtering using Regular expression. UNIX Processes – Pipes – Signals – Process Utilities (ps, kill, wait, sleep)- Filters: cat, head, tail, sort, uniq grep, fgrep, egrep – Sed.	K3	12
III	**Shell Scripting:** Variables – Loops – Functions – Quoting - Here documents – Arithmetic. Programming Tools: make, nmake, gmake - rcs, cvs, sccs - ar, tar, cpio, pax - RPM, autoconfig - dbx, gdb	K2	12
IV	**The Linux operating system:** The history of Linux – Linux Architecture – Linux compared to UNIX – Features and utilities in Linux – Shell available in Linux – Creating files using the Vi editor: Text editors – The Vi editors – The emacs editors – The joe editors. Managing **Files and Directories:** Introduction – Directory commands in Linux – File Commands in Linux.	K3	12
V	**Managing Documents:** Locating files in Linux – standard files – Redirection – Filters – Pipes. **Communicating with other users in Linux:** mesg command – whoT- talk – write – finger – chfn utility – ping – traceroute command – ssh command – FTP command – ncftp command.	K4	12

Learning Resources	
Text Books	1. Sumitabha das, "UNIX Concepts and Applications" fourth edition Tata Mcgraw Hill Publishing Company Limited,2006. 2. Operating System LINUX, NIIT Prentice Hall of India Private Ltd, New Delhi,2003.
Reference Books	1. John Muster "Introduction to UNIX and LINUX" Tata Mcgraw Hill Publishing Company Limited,2003 2. Richard Petersen "The Complete Reference" Tata Mcgraw Hill Edition, 2008. 3. N.B.Venkateswarlu,Introduction to LINUX :Installation & Programming ,B.S Publications. 4. Introcurion to UNIX and Shell Programming,M.G.Venkateshmurthy, 2011 Pearson Edition.
Web Sites / Links	1. https://www.linux.com 2. http://www.ee.surrey.ac.uk/Teaching/Unix/unixintro.html

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3	✓	✓		✓
CO4	✓		✓	
CO5	✓		✓	✓
CO6		✓		
CO7		✓		✓

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN [AUTONOMOUS]

ELAYAMPALAYAM, TIRUCHENGODE - 637 205.

PG and RESEARCH DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

B.Sc. COMPUTER TECHNOLOGY

Curriculum for Academic year 2018 – 19

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER CBCS & OBE PATTERN

for the Candidates admitted from the year 2018-2019

Sem	Course Code	Part	Courses	Hour	Credit	Marks		
						Int. Marks	Ext. Marks	Total Marks
I	18U1LT01	I	Tamil-I	6	3	25	75	100
	17U1LE01B	II	English I	6	3	25	75	100
	18U1CTC01	IV	Core – I Digital Computer Fundamentals & C Programming	4	5	25	75	100
	18U1CTCP01	IV	Core Lab I – Problem Solving and C Programming Lab	4	3	40	60	100
	18U1MAA03	III	Allied-I Numerical Methods	4	4	25	75	100
	18U1CTC02	IV	Core-II - Basics of Hardware	4	3	25	75	100
	17U1VE01		Value Education	2	2	25	75	100
	TOTAL			**30**	**23**	**190**	**510**	**700**
II	18U2LT02	I	Tamil-II	6	3	25	75	100
	18U2LE02	II	English-II	6	3	25	75	100
	18U2CTC03	IV	Core III –Programming in C++	5	5	25	75	100
	18U2CTCP02	IV	Core Lab II – C++ Programming Lab	5	4	40	60	100
	18U2MAA06	III	Allied- II Discrete Mathematics	4	4	25	75	100
	18U2ES01		Environmental Studies	4	4	25	75	100
	TOTAL			**30**	**23**	**165**	**435**	**600**
	18U3CTC04	IV	Core IV – Data Structures &Algorithms	4	3	25	75	100
	18U3CTC05	IV	Core V- Java Programming	4	3	25	75	100
	18U3CTC06	IV	Core VI- Relational Database Management Systems	4	3	25	75	100
	18U3CTCP03	IV	Core Lab III - RDBMS Lab	4	3	40	60	100

III	18U3MAA10	III	Allied- III Resource Management Techniques-I	4	4	25	75	100
	18U3CTCP04	IV	Core Lab IV – Java Programming Lab	4	3	40	60	100
	18U3CTS01	VII	SBEC-I – Office Package	2	2	25	75	100
		VI	NMEC-I (Quantitative Aptitude)	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**230**	**570**	**800**
IV	18U4CTC07	IV	Core VII Microprocessor and Computer Architecture	4	3	25	75	100
	18U4CTC08	IV	Core VIII-Computer Networks	4	3	25	75	100
	18U4CTC09	IV	Core IX- Operating Systems	4	3	25	75	100
	18U4CTC10	IV	Core-X- Dot net Programming	4	3	25	75	100
	18U4CTCP05	IV	Core Lab V- Dot net Programming Lab	4	3	40	60	100
	18U4CMA04	III	Allied-IV Cost and Management Accounting	4	4	25	75	100
	18U4CTS02	VII	SBEC-II (Basics of Unix and Linux)	2	2	25	75	100
		VI	NMEC-II	2	2	25	75	100
			Library	**1**	-	-	-	-
			Sports	**1**	-	-	-	-
	TOTAL			**30**	**23**	**215**	**585**	**800**

V	18U5CTC11	IV	Core-XI Web Technology	5	5	25	75	100
	18U5CTC12	IV	Core-XII Software Engineering	5	5	25	75	100
	18U5CTC13	IV	Core-XIII Data Mining and Warehousing	5	3	25	75	100
	18U5CTE__	V	Elective –I	4	3	25	75	100
	18U5CTCP06	IV	Core Lab VI- PHP Programming Lab	4	3	40	60	100
	18U5CTS03	IV	SBEC-III PHP Programming	2	2	25	75	100
	18U5CTPR01		PROJECT – I Project Work- (In house -Project)	4	3	25	75	100
			Library / Sports	**1**	**-**	**-**	**-**	**-**
	TOTAL			**30**	**24**	**230**	**570**	**800**
VI	18U6CTC14	IV	Core-XIV Computer Graphics & Animation	5	4	25	75	100
	18U6CTC15	IV	Core – XV Python Programming	5	4	25	75	100
	18U6CTE__	V	Elective –II	4	3	25	75	100
	18U6CTCP07	IV	Core Lab VII – Computer Graphics & Animation Lab	4	3	40	60	100
	18U6CTCP08	IV	Core Lab VIII – Python programming Lab	4	3	40	60	100
	18U6CTC16	IV	Core –XVI - Internet of Things	4	4	25	75	100
	18U6CTS04	VII	SBEC-IV Soft Skills	2	2	25	75	100
	18U6EX01		Extension Activities	1	1	-	-	-
			Library / Sports	1	-	-	-	-
	TOTAL			**30**	**24**	**205**	**495**	**700**
GRAND TOTAL				**180**	**140**	**1235**	**3165**	**4400**

ELECTIVE COURSES

ELECTIVE – I

Semester	Course Code	Course Name
V	18U5CTE01	Software Testing
V	18U5CTE02	Soft Computing
V	18U5CTE03	Big Data Analytics

ELECTIVE – II

Semester	Course Code	Course Name
VI	18U6CTE04	Cloud Computing
VI	18U6CTE05	Network Security & Cryptography
VI	18U6CTE06	Machine Learning

B.Sc. COMPUTER TECHNOLOGY

PROGRAM SPECIFIC OUTCOMES

After completion of the programme the graduates will be able to

PSO1: To understand the fundamental concepts of computer system, including hardware and networking.

PSO2: To Design, and analyze precise specifications of algorithms, procedures, and interaction behavior.

PSO3: Ability to communicate effectively in both verbal and written form in industry and society.

PSO4: Apply the technologies in various fields of Computer Technology including Fundamentals of Digital Computer, Microprocessor, Relational Database Management System, Computer Networks, Multimedia Design and Applications and Web Technology etc.

MAPPING OF PEO'S AND PO'S

PSO/PO	PO1	PO2
PSO1	✓	
PSO2	✓	
PSO3	✓	✓
PSO4	✓	✓
PSO5		✓

Subject Title	Web Technology	Semester	V
Subject Code	18U5CTC11	Specialization	NA
Type	Core-XI Theory	L:T:P:C	5:0:0:5

COURSE OBJECTIVE

- To provide fundamental concept of HTML, JavaScript, XML, JSP, ASP
- Learn how to combine basic HTML elements to create Web pages.
- Understand how to use HTML tags and tag attributes to control a Web page's appearance.
- To develop professional software development skills.
- To develop a web application using java technologies

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To understand the principles of creating an effective web page	K5
CO2	Describe the function of Hypertext Markup Language (HTML) in Web communication	K2
CO3	To develop a dynamic webpage by the use of java script	K1
CO4	To write a well formed / valid XML document	K3
CO5	Describe the function of Cascading Style Sheets (CSS) in Web communications and describe the relationship between CSS and HTML.	K2

Unit	Syllabus Contents	Levels	Number of Sessions
I	**HTML**: What is Markup Language? – HTML Values and Units – What goes into the Web document?: - Overall Document Structure – Block Elements – Head Elements – Text structuring essentials – Character Formatting essentials – Lists	K3	12
II	**Links**: Linking to a Web page – Tables – Frames – Forms – Colors and images: Web color basics – Image formats for the Web – Creating Graphics – Inserting an image – Image Maps – Special Characters.	K4	12
III	**JavaScript**: JavaScript in Web Pages – The Advantages of JavaScript – Structure of a JavaScript – Syntax – Operators and Expressions – Constructs and conditional checking – Functions – Placing text in a browser – Dialog Boxes – Form object's methods – Built in objects – user defined objects.	K4	12
IV	**An introduction to XML**: XML Basics – XML Syntax – Working with Document Type Definitions – Introducing XML Schemas – Working with Schemas – Using XML.	K3	12
V	**CSS Basics**: The purpose of Styles – Defining & Cascading Styles – Style Definitions: The Style definition format – Understanding Selectors – Using Pseudo classes – Pseudo elements – Shorthand expressions –Font properties - Text Formatting – CSS Lists – Padding, Margins and Borders – Colors and Backgrounds – CSS Layouts	K3	12

Learning Resources	
Text Books	1. HTML, XHTML, and CSS Bible, Fifth Edition , 2010, Published by Wiley Publishing, Inc (UNIT I,II,IV & V) 2. "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", Ivan Bayross, BPB Publication. (UNIT III)
Reference Books	1) Mastering-HTML-CSS-Javascript Web Publishing – SAMS – BPB Publications 2) HTML & CSS: The Complete Reference, Fifth Edition – 2017 – Thomas A.Powell
Web Sites / Links	1) https://www.w3schools.com/html/ 2) https://script.spoken-tutorial.org/index.php/Javascript 3) https://www.w3schools.com/js/default.asp

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MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3	✓	✓		✓
CO4	✓		✓	
CO5	✓		✓	✓

Subject Title	Software Engineering	Semester	V
Subject Code	18U5CTC12	Specialization	NA
Type	Core-XII Theory	L:T:P:C	5:0:0:5

COURSE OBJECTIVE

- Introduce software engineering basics
- To Learn Cost Estimation, Design notations and Software testing
- Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills
- Capable of team and organizational leadership in computing project settings

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	An ability to work in one or more significant application domains	K2
CO2	Work as an individual and as part of a multi disciplinary team to develop and deliver quality software	K3
CO3	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle	K3
CO4	Demonstrate an ability to use the techniques and tools necessary for engineering practice	K4
CO5	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment	K1

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction to Software Engineering:** Definitions – Size Factors – Quality and Productivity Factors. **Planning a Software Project:** Planning the Development Process – Planning an Organizational Structure. **Software Development Life cycle models.**	**K3**	**12**
II	Software cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Estimation Costs. **Software Requirements Definition:** The Software Requirements specification – Formal Specification Techniques.	**K3**	**12**
III	**Software Design:** Fundamental Design Concepts – Modules and Modularization Criteria. Design Notations – Design Techniques. **Implementation Issues:** Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation Guidelines.	**K3**	**12**
IV	**Verification and Validation Techniques:** Quality Assurance – Walkthroughs and Inspections – Unit Testing and Debugging – System Testing. **Software Maintenance:** Enhancing Maintainability during Development – Managerial Aspects of Software Maintenance – Configuration Management	**K4**	**12**
V	**Software Testing Process:** Psychology of Testing-Testing Team and development Team-Characteristics of Test Engineers-Levels of Testing-Testing Approaches- Types of Testing-test Plan. Manual testing and its limitations. **Software Testing Tools: Overview – Examples.**	**K3**	**12**

Learning Resources

Text Books	1. Richard Fairley, "Software Engineering Concepts, TMH 2007. 2. Dr.K.V.K.K Prasad "Software Testing Tools, Dream Tech Press, 2010.
Reference Books	1. Eve Anderson, Philip Greenspun, Andrew Grumet, "Software Engineering for Internet Applications", PHI 2006. 2. Jeff Tian, "Software Quality Engineering" Student edition, 2006, Wiley India.
Web Sites / Links	1. www.softwareengineerinsider.com/articles/what-is-software-engineering.html 2. https://www.udemy.com/courses/development/software-engineering 3. https://www.tutorialspoint.com/software_testing/index.htm

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓		✓	
CO2			✓	
CO3	✓			✓
CO4			✓	
CO5	✓		✓	✓

Subject Title	Data Mining and Warehousing	Semester	V
Subject Code	18U5CTC13	Specialization	NA
Type	Core –XIII Theory	L:T:P:C	5:0:0:3

COURSE OBJECTIVE

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand Data Warehouse fundamentals, Data Mining Principles	K5
CO2	Design data warehouse with dimensional modelling and apply OLAP operations	K2
CO3	Identify appropriate data mining algorithms to solve real world problems	K1
CO4	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining	K3
CO5	Describe complex data types with respect to spatial and web mining	K2

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction**: What motivated data mining?-Why is it important?-What is data mining?-Data mining-On what kind of data?-Data mining Functionalities-Classification of Data mining-Data mining task primitives-Integration of a Data mining System with a Database or Data Warehouse System-Major issues in Data mining	K3	12
II	**Data Preprocessing**: Why Preprocess the Data?-Descriptive Data Summarization-Data Cleaning-Data Integration and Transformation-Data Reduction-Data Discretization and Concept Hierarchy Generation	K3	12
III	**Mining Frequent patterns, Associations and Correlations**: Mining various kinds of association Rules-Classification and Prediction: What is Classification? What is Prediction? Issues regarding classification and Prediction-Bayesian Classification-Classification by Back propagation-Prediction	K4	12
IV	Types of Data in cluster Analysis-Categorization of major Clustering methods Hierarchical methods-Density-based Methods-Spatial Data mining-Text mining-Data Mining Applications-Social Impacts of data mining-Trends in data mining	K4	12
V	**Data Warehouse and OLAP Technology**: What is Data Warehouse? A Multidimensional Data Model-Data Warehouse Architecture-Data Warehouse Implementation	K3	12

Learning Resources	
Text Books	1. Jiawei Han and Micheline Kamber,"DATA MINING Concepts and Techniques", Morgan Kaufmann Publishers,Second Edition,2006.
Reference Books	1. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Printice Hall, 2008. 2. Arun K.Pujari, "Data Mining Techniques", Universities Press (India) Limited, 2001. 3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2008.
Web Sites / Links	1. https://en.wikipedia.org/wiki/Data_mining 2. www.hinduwebsite.com/webresources/data_warehousing.asp

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2			✓	
CO3	✓	✓		✓
CO4			✓	
CO5	✓			✓

Subject Title	PHP Programming Lab	Semester	V
Subject Code	18U5CTS03	Specialization	NA
Type	SBEC III	L:T:P:C	0:0:2:2

COURSE OBJECTIVE

- To develop applications in PHP using various concepts like to establish the connectivity between PHP and MySQL and develop programs to add records, retrieve records and delete records from a table.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To Understand the usage of PHP and MySQL in dynamic web development.	K3
CO2	Analyze the construction of a web page and relate how PHP and HTML combine to produce the web page	K3
CO3	Compare and contrast PHP variable types, and relate the advantages and disadvantages of PHP variables with local or global scope	K3
CO4	Formulate, design and create PHP control structures, including selection and iterative structures	K2
CO5	Build a simple, yet functional web application using PHP/MySQL.	K3

List of Programs
1. Develop PHP program using the following a. Use of conditional statements in PHP b. Use of looping statements in PHP c. Use of different types of arrays
2. Write a PHP program to prepare the student marks list.
3. Create a PHP Program to find odd or even number from given numbers.
4. Write a PHP Program to demonstrate the variable function a. Gettype() b. Settype() c. Isset() d. Unset()
5. Give the example of String function a. Substr() b. Strcmp() c. Strcasecmp() d. Strpos()
6. Write a PHP Program that demonstrate Form element input elements.
7. Database connectivity in PHP with MySQL.
8. To Create a create a table using PHP Programming.
9. To create a table and do all the DDL commands using PHP Programming.
10. Develop a PHP program to display student information using MYSQL table.
11. Creating simple webpage using PHP.
12. Create a College Web site using PHP Program.

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2			✓	
CO3	✓	✓		✓
CO4				
CO5	✓		✓	✓

Subject Title	PHP PROGRAMMING	Semester	V
Subject Code	18U5CTS03	Specialization	NA
Type	SBEC III Theory	L:T:P:C	2:0:0:2

COURSE OBJECTIVE

- Deep understanding of the PHP scripting language to the high end
- Provides the student with the necessary tools to write scripts that are secure, efficient and reliable.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of PHP programming language with Basics & Control Structures	K3
CO2	Working PHP With MySQL	K3
CO3	Display and insert data using PHP and MySQL.	K2
CO4	Applying the concepts of Object Oriented PHP, Error and Exception Handling in PHP Programming	K4
CO5	Explore the concepts Strings and Regular Expression, Design the Web Form	K2

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction to PHP:** History - General Language Features – PHP Basics: Embedding PHP Code in your Web Pages - Commanding Your Code - Output Data to the Browser. PHP's Supported Data Types- Identifiers – Variables – Constants – Expressions –String – Interpolation. **Control Structures:** Conditional Statements - Looping Statements - File Inclusion Statements	K3	12
II	**Introduction to MySQL:** Naming Database Elements-Choosing Your Column Types- Choosing other Column Properties- Accessing MySQL. **Using PHP With MySQL** Modifying The Template - Connecting To MySQL - Executing Simple Queries - Retrieving Query Results -Ensuring Secure SQL-Counting Returned Records-Updating Records With PHP.	K3	12
III	**Functions**: Invoking Function - Creating a Function - Function Libraries. **Arrays:** Creating an Array - Adding and Removing Array Elements - Locating Array Elements - Traversing Array - Merging – Slicing - Splicing and Dissecting Array.	K4	12
IV	**Object Oriented PHP:** Benefits of OOP - Key OOPs Concepts-Constructors and Destructors- Static Class Members –The instance of Keyword- **Error and Exception Handling-** Configuration Directives- Error Logging-Exception Handling	K4	12
V	**Strings and Regular Expression:** Other String Specific Function - Alternatives for Regular Expression Functions**. Forms:** PHP and Web Forms-Taking Advantage of Pear: HTML - Quick Form-Installing HTML - Quick Form-Creating a Simple Form- Using Auto-Completion	K3	12

Learning Resources	
Text Books	1. "Beginning PHP and Oracle From Novoice to professional" W.Jason Gilmore and Bob Brylr edition – 2008 2. "PHP 6 and my SQL 5 " Larry Ullman -2008(chapter 4 & 8)
Reference Books	1. "Spring into PH5 the Small Professional choice" Steven Holzner, Pearson education, Edition: First Impression 2006. 2. "PHP and my SQL for dynamic websites" – Larry Ullam-fourth edition 2015 3. "PHP 6 and my SQL ": bible – Steve Suehring, Tim converse, Joy Park -2009
Web Sites / Links	3. "Beginning PHP and Oracle From Novoice to professional" W.Jason Gilmore and Bob Brylr edition – 2008 4. "PHP 6 and my SQL 5 " Larry Ullman -2008(chapter 4 & 8)

Pedagogy: Chalk and Talk, PPT ……..

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		✓
CO2			✓	
CO3	✓	✓		✓
CO4		✓		
CO5	✓		✓	✓
CO6		✓		✓

Subject Title	**Project Work** **(In-House Mini Project)**	**Semester**	**V**
Subject Code	**18U5CTPR01**	**Specialization**	**NA**
Type	**Project Work**	**L:T:P:C**	**0:0:4:3**

COURSE OBJECTIVE

- To understand the problem in clear and concise mode
- To know how to connect the statement with the problem
- Usage of features of programming language in project.
- Design the whole project

Project Work Pattern

FIRST REVIEW: **(20 Marks)**

1. Project Title
2. Project Platform (Language / Package Selected)
3. Confirmation Letter (from Company / Industry)
4. Details of Internal Guide with Designation & Qualification (in the company / Industry)
5. Presentation

SECOND REVIEW: **(20 Marks)**

1. Work Observation
2. Modules in Project (Design Screens Sample)
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Estimated Time of Completion
5. Completed Work in the form of Percentage Analysis
6. PowerPoint Presentation.

FINAL REVIEW: **(60 Marks)**

1. Documentation
2. Screens Shots
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Final Project Report (with executable format including complete source code)

Subject Title	Computer Graphics and Animation	Semester	VI
Subject Code	18U6CTC14	Specialization	NA
Type	Core-XIV Theory	L:T:P:C	5:0:0:4

The Passing minimum shall be 40% out of 60 marks (24 Marks)

COURSE OBJECTIVE

- To develop an understanding and awareness how issues such as content, information architecture, motion, sound, design, and technology merge to form effective and compelling interactive experiences for a wide range of audiences and end users.
- To become familiar with various software programs used in the creation and implementation of multi- media
- To appreciate the importance of technical ability and creativity within design practice.
- To understand the two dimensional, three-dimensional graphics and their transformations.
- To become familiar with understand clipping techniques
- To become familiar with Blender Graphics

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Design two dimensional graphics.	K4
CO2	Apply two dimensional transformations.	K3
CO3	Design three dimensional graphics.	K2
CO4	Apply three dimensional transformations.	K2
CO5	Apply Illumination and color models.	K3

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1		✓		
CO2	✓		✓	
CO3		✓		✓
CO4		✓		
CO5	✓		✓	✓

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Introduction To Computer Graphics:** Computer Graphics and Its Types, Application of computer graphics - GUI - Video Display Devices – CRT - Raster and Random scan displays – Input Devices - Hard Copy Devices - Line Drawing Algorithm - DDA Algorithm - Line Function – Circle Generating Algorithm.	K4	12
II	**Attributes Of Output Primitives:** Line Attributes - Curve Attributes - Color and Gray Scale Levels -Area Fill Attributes - Character Attributes - Bundled Attributes. **Two Dimensional Geometric Transformations:** Basic Transformations – Matrix Representations -Composite Transformation – Translation – Rotation – Scaling - Reflection and Shear.	K5	12
III	**Two Dimensional Viewing:** Viewing Pipeline - Viewing Functions - Point Clipping and Line Clipping - Cohen Sutherland Line Clipping - Polygon Clipping – Sutherland – Hodgeman Clipping - Curve and Text Clipping - Exterior Clipping.	K5	12
IV	**GUI and Interactive Input Methods:** Input of Graphical Data - Input Functions - Picture Construction Techniques. COLOR MODELS: XYZ - RGB - YIQ - CMY Color Models.	K4	12
V	**Multimedia:** Images and Graphics. VIDEO AND ANIMATION: Computer Based Animation – Basic Concepts – Animation Languages – Methods of Controlling Animation – Display of Animation – Transmission of Animation – Comments.	K5	12

Pedagogy : Chalk and Talk, PPT ……..

Subject Title	Python Programming	Semester	VI
Subject Code	18U6CTC15	Specialization	NA
Type	Core-XV Theory	L:T:P:C	5:0:0:4

COURSE OBJECTIVE

- To learn a dynamic, interpreted (Byte code-Compiled) and high level programming language.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understanding Modules and Functions in Python Programming	K2
CO2	Learning about Conditions and Decision Making in Python Programming	K3
CO3	Working with Lists, Tuples and Dictionaries in Python Programming	K3
CO4	Executing Files, Modules and Packages using Error Exception.	K4

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		✓
CO2	✓		✓	
CO3		✓		✓
CO4	✓		✓	✓
CO5	✓		✓	

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Python:** Introduction – Python interpreter and interactive mode – Values & Types – Variable – Expressions and Statements – Assigning Values in Python, Variable Declaration, Multiple Assignment – **Operators** – Types of Operators, Operator Precedence – Modules and Functions: Modules, Function Definition and Use, Defining a Function, Calling Function, Uses of Function, Advantages of Functions - Flow of Execution.	**K1**	**12**
II	**Conditionals:** Booleans Values and Operators – Operators – Operator Precedence – Decision Making – if, if… Else, If…Elif… Else & Nested statements – Iteration – Fruitful Functions – Scope of Variable – Global and Local Variable in Function, Nonlocal Variable – Composition – Recursion. **Parameters and Arguments:** Functions with No Arguments, Functions with Arguments, Functions with Return Value.	**K2**	**12**
III	**Strings:** String Slices – String are Immutable – String Functions and Methods – String Module – Lists as Array. **Lists:** Accessing Elements in Lists Using Subscript Operator, List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters, Deleting List Elements, Python Functions for List Operations, List Comprehension.	**K3**	**12**
IV	**Tuples:** Advantages of Tuple Over List, Accessing Values, Updating Tuples, Delete Tuple Elements, Tuple Assignment, Tuple Methods, Other Tuple Operations, Tuples As Return Values, Built-in Functions with Tuple, Variable Length Arguments Tuples – **Dictionaries:** Built-in Dictionary Functions and Methods, Access update and Add Elements, Delete and Remove Elements, Sorting, Iterating through, Reverse Lookup, Inverting a Dictionary, Memorization(Memos)	**K4**	**12**
V	**Files:** Reading and Writing, Format Operator, Command Line Arguments – Errors and Exceptions: Errors, Exceptions. Modules: Writing Modules, Locating Modules. **Packages:** Steps to create a Python Package.	**K5**	**12**

Learning Resources

Text Books	1. Dr. S. Suresh kumar, “Problem Solving and Python Programming” Charulatha Publications, 2018.
Reference Books	1. Python Essential Reference (4th Edition): David Beazley 2. Beginning Python: From Novice to Professional Beginning (Beginning From Novice to Professional) by Magnus Lie Hetland second edition) 3. Core Python Programming (2nd Edition): Wesley J Chun.

Subject Title	Python Programming Lab	Semester	VI
Subject Code	18U6CTP08	Specialization	NA
Type	Core Lab -VIII	L:T:P:C	0:0:4:3
Web Sites / Links	1.https://www.w3schools.com/python/ 2.https://www.learnpython.org/ 3.https://docs.python.org/3/tutorial/		

Pedagogy : Chalk and Talk, PPT ……..

COURSE OBJECTIVE

To enable the students to gaining knowledge on Python Programming through practices

COURSE OUTCOMES

CO Number	CO STATEMENT	Knowledge Level
CO1	Design programs using Iterations	K1
CO2	Working with Arrays for Data Structure	K2
CO3	Implement the Command line Argument in Python programming	K4
CO4	Implement the File processing in Python programming	K5

MAPPING WITH PROGRAM OUTCOMES

CO/ PSO	PSO1	PSO2	PSO3	PSO4
CO1		✓	✓	
CO2	✓	✓		✓
CO3			✓	
CO4	✓			✓

Subject Title	Computer Graphics and Animation Lab	Semester	VI
Subject Code	18U6CTCP07	Specialization	NA
Type	CORE LAB VII	L:T:P:C	0:0:4:3

List of Programs:

1. To compute the GCD of Two Numbers.
2. Find square root of a Number.
3. To find the exponentiation of a given positive Number.
4. To display elements of list in reverse order.
5. List the first N prime Numbers.
6. Find the Maximum & Minimum elements in a list
7. Implement Python Script to check given string is palindrome or not.
8. Remove all the duplicate elements in a list.
9. Implement a program that take command line Arguments.
10. Implement a python program find the most frequent words in a text read from a file.

COURSE OBJECTIVE

- To make the students understand graphics concepts and develop, design and implement two and three dimensional graphical structures using OpenGL.
- To understand multimedia compression techniques and applications of multimedia.
- To gain knowledge about graphics hardware devices and software used.
- To understand the two-dimensional graphics and their transformations.
- To understand the three-dimensional graphics and their transformations.
- To appreciate illumination and color models

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Understand how to generate line, circle and ellipse also how to create 2D object and various transformation techniques.	K3
CO2	Understand various 3D Transformation techniques using OpenGL.	K3
CO3	Understand multimedia compression techniques and Applications.	K2
CO4	To understand the two-dimensional ,three –dimensional graphics and their transformations	K3
CO5	To understand about Image Editing and Manipulation	K4

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓		✓	
CO3	✓	✓		✓
CO4	✓		✓	
CO5	✓		✓	✓

List of Programs

Implement The Exercises From 1 To 4 Using C

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – and Circle (Midpoint)
2. Implementation of 2DGeometric transformations: Translation, Rotation, Scaling, Reflection, Shear.
3. Implementation of Composite 2D Transformations.
4. Implementation of Liang - Barsky Line Clipping.

Implement the exercises from 5 to 7 using OpenGL

5. Implementation of 3D Transformations - Translation, Rotation, Scaling
6. Implementation of 3D Projections – Parallel, Perspective
7. Creating 3D Scenes
8. Compression Algorithms - To implement text and image compression algorithms.
9. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization
10. 2D Animation – To create Interactive animation using any authoring tool.

Subject Title	Internet of Things	Semester	VI
Subject Code	18U6CTC16	Specialization	NA
Type	Core-XVI Theory	L:T:P:C	4:0:0:4

COURSE OBJECTIVE

- Obtain an overview of IoT applications.
- Comprehend the architecture, design principles and standards of IoT.
- Understand M2M and IoT technology fundamentals.
- Knowing about Python language.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To know about the evolution for mobile, home and embedded applications that is connected to the internet, to integrate communication.	**K2**
CO2	To gather knowledge about how the devices share the data on the cloud and analyze it in a secure manner on the network.	**K1**
CO3	To know how the industries are adopting Internet of Things solutions technology to improve their existing systems.	**K4**
CO4	To get knowledge about how the things to be connected with various devices.	**K5**
CO5	To get familiar about python data types and control statements.	**K6**

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1		✓	✓	
CO2	✓	✓		
CO3			✓	
CO4	✓			
CO5		✓		✓

Unit	Syllabus Contents	Levels	Number of Sessions
I	**INTRODUCTION TO INTERNET OF THINGS:** Introduction - Physical Design of IoT **-** Things in IoT, IoT Protocols - Logical Design of IoT - IoT Functional Blocks, IoT Communication Models, IoT Communication APIs.	**K2**	**12**
II	**IoT ENABLED TECHNOLOGIES:** Wireless Sensor Networks - Cloud Computing - Big data analytics - Communication protocols - Embedded Systems. IoT Levels & Deployment Templates.	**K1**	**12**
III	**DOMAIN SPECIFIC IoTS:** Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle. IoT and M2M-M2M, Differences between IoT and M2M, SDN and NFV for IoT.	**K4**	**12**
IV	**IOT PLATFORMS DESIGN METHODOLOGY**: Introduction - IoT Design Methodology. Case Study on IoT System for Weather Monitoring.	**K5**	**12**
V	**IOT SYSTEMS-LOGICAL DESIGN USING PYTHON:** Introduction – Installing Python – Python Data Types & Data Structures: Control Flow - Functions – Modules – Packages - File Handling - Date / Time Operations - Classes.	**K6**	**12**

Learning Resources	
Text Books	1. Arshdeep Bahga, Vijay Madisetti " Internet of Things, A Hands on Approach" Universities Press 2015.
Reference Books	1. Oliver Hersent, David Boswarthick, Omar Elloumi. " The Internet of Things – Key applications and Protocols", Wiley, 2012.
Web Sites / Links	1. www.theinternetof things.eu 2. www.cisco.com/c/en_in/solutions/internet-of-things/overview.html

Pedagogy : Chalk and Talk, PPT ……..

Subject Title	Soft Skills	Semester	VI
Subject Code	18U6CTS04	Specialization	NA
Type	SBEC – IV	L:T:P:C	2:0:0:2

COURSE OBJECTIVE

- To enable students to build a repositories of functional vocabulary and to move from the lexical level to the syntactic level.
- To train students to summon words, phrases relevant to the immediate communication tasks. To enable students to comprehend the concept of communication.
- To teach students the four basic communication skills, Listening, Speaking, Reading and Writing.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	To develop communication skills and to know about the stages of communication.	K2
CO2	To Understanding about the listening and speech process.	K1
CO3	Able to know how to face the interview and to prepare for the interview.	K4
CO4	Making to discuss a topic with friends or classmates helps in learning the topic with perfection. It involves sharing of learning by the participants which equally benefits all the participants.	K5
CO5	To provide an opportunity to make it easier to engage the audience, Flexibility, Consistency and Versatility.	K6

MAPPING WITH PROGRAM OUTCOMES

CO/PO	PO1	PO2	PO3	PO4
CO1	✓	✓		
CO2	✓	✓		
CO3			✓	✓
CO4			✓	✓
CO5		✓	✓	✓

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Nature of technical communication**: Communication as sharing – Stages of communication – Channels of communication – Nature of technical communication – Importance and need for technical communication – Technical communication skills.	K2	4
II	**The Listening process**: Types of listening – Listening with a purpose – Barriers to listening –The speech process – Conversation and oral skills –Strategies for good conversation – Improving fluency and self-expression – Body language.	K1	4
III	**Job interviews**: Interview process – Characteristics of job interview– Pre-interview preparation techniques – Interview questions – Answering strategies – Frequently asked interview questions – Projecting a positive image – Alternative interview formats.	K4	4
IV	**Group Discussion**: Nature of group discussion – Characteristics of successful group discussions – Selection group discussion – Group discussion strategies – Techniques for individual contribution – Group interaction strategies.	K5	4
V	**Presentation Skills**: Nature and importance of oral presentation – Planning the presentation – Preparing the presentation – Organizing your presentation – Rehearsing the presentation – Improving delivery.	K6	4

Learning Resources	
Text Books	1. M. Ashraf Rizvi, "Effective Technical Communication" Tata McGraw – Hill Publishing Company Limited , New Delhi.Unit -I (Chapter-1), Unit-II(Chapter-4,6), Unit-III(Chapter-9), Unit-IV(Chapter-10), Unit-V(Chapter-11).
Reference Books	1.Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw-Hill. New Delhi 2.Sasikumar.V and P.V. Dhamija. "Spoken English: A Self-Learning Guide to Conversation Practice. ", 1993 34th Reprint. Tata McGraw-Hill. New Delhi.
Web Sites / Links	• https://www/ibm.com/blogs/internet-of-things/what-is-the-iot • https://www.sap.com/india/trends/inter-of-things.html • https://computer.howstuffworks.com>tech>Computer>Internet>Connectivity

Pedagogy : Chalk and Talk, PPT ……..

Subject Title	Programming in C++	Semester	II	Hours:60
Subject Code	17U2CTC04	Specialization	NA	
Type	Core - IV	L:T:P:C	4:0:0:3	

Objectives

1. To understand the basic concepts of OOPs.
2. With the help of methods and classes present in C++ and Java languages.

Unit	Syllabus Contents	Number of Sessions
I	Basic Concepts of OOP – Benefits of OOP – Applications of OOP - Structure of C++ - Applications of C++ -Tokens- Keywords- Identifiers and Constant-Data types - Variables – Operators-Manipulators-Expressions-Control Structures. Functions – Prototype- Call by Reference- Return by reference- Inline Functions- Default Arguments- const Arguments- Function Overloading- Friend and Virtual Function.	12
II	Classes and Objects – Class – Member Functions-Array with in a class- Memory Allocation for Objects- Static data members – Static member function- Array of Objects- Objects as Function Arguments – Friendly Functions-Returning Objects-const Member Functions- Pointers to Members, Constructors and Destructors.	12
III	Operator Overloading and type conversions. Inheritance: Extending classes- Derived Classes- single inheritance- Multilevel Inheritance- Multiple Inheritance- Hierarchical Inheritance- Hybrid Inheritance- Virtual Base Classes- Abstract Classes, Pointers, virtual Functions and Polymorphism: Pointers – Pointers to Objects – these Pointers Virtual Functions – Pure Virtual Functions.	12
IV	Managing I/O Operations: Streams in C++ - C++ Stream Classes – Formatted and Unformatted I/O Operations Managing Output with Manipulators. Working with Files: Classes for file Stream Operations-Opening and closing a File – Detecting end-of-file- File Pointers and their Manipulators – sequential I/O Operations- Updating a file- Error Handling during File Operations- Command Line Arguments	12
V	Templates: Class templates- Class templates with Multiple Parameters- Function templates- Function Templates with Multiple Parameters- overloading of Templates Functions- Member Function Templates- Non- type template arguments, Exception Handling: Basics- Exception Handling Mechanism- throwing Mechanism- Catching Mechanism- Rethrowing an Exception – Specifying Exceptions. Manipulating Strings.	12

Learning Resources	
Text Books	1. E.Balagurusamy, "Object-Oriented Programming with C++", Tata McGraw Hill Publishing Company Limited, New Delhi ,Second Edition, 2001. UNIT-I(CHAPTER-1,2,3,4),UNIT-II(CHAPTER-5,6,7),UNIT-III(CHAPTER-8,9,10), UNIT-IV(CHAPTER-11,12,13). 2. Bahrami "Object Oriented Systems", McGraw Hill International Edition,1999. UNIT-V(CHAPTER 3,5)
Reference Books	1. Bjarne Stroustrup," The C++ Programming Language", 4th Edition , 2013. 2. Mike McGrath,"C++ Programming in Easy Steps",4th Edition, 2011. 3. Robert Lafore, " Object Oriented Programming in Turbo C++", Galgotia ,2001.
Web Sites / Links	1. www.tutorialspoint.com 1. www.wikepedia.com