BACHELOR OF COMPUTER APPLICATIONS

Syllabus

AFFILIATED COLLEGES

Program Code: 22J

2021 – 2022 onwards

BHARATHIAR UNIVERSITY

(A State University, Accredited with "A" Grade by NAAC,
Ranked 13th among Indian Universities by MHRD-NIRF,
World Ranking : Times - 801-1000, Shanghai - 901-1000, URAP - 982)

Coimbatore - 641 046, Tamil Nadu, India

Program Educational Objectives (PEOs)	
The **BCA** program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO 1	To impart advance knowledge about various sub-domains related to the field of computer applications
PEO 2	To provide the strong character to uphold the spiritual and cultural values of our country to make students acceptable to both industries and higher education.
PEO 3	Graduates will be capable of attaining higher position in their professional carrier, capable to do quality research by strengthening their mathematical, scientific and basic engineering fundamentals.
PEO 4	Graduate will be capable of adopting the changing technologies, tools, and industrial environment.
PEO 5	Graduates will promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.

Program Specific Outcomes (PSOs)	
After the successful completion of BCA program, the students are expected to	
PSO 1	Develop proficiency in problem solving and logical thinking skill.
PSO 2	To impart the knowledge of programming languages, web designing, networking and Software development cycle.
PSO 3	Enrich the communicative ability to present orally throughout all the stages of Software development process
PSO 4	Learn latest development and technologies in IT and Communications system.
PSO 5	Implementation of professional engineering solutions for the betterment of society keeping the environmental context in mind, be aware of professional ethics and be able to communicate effectively.

Program Outcomes (POs)	
On successful completion of the BCA program	
PO1	**Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity.
PO2	**Scientific reasoning/ Problem analysis**: Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science.
PO3	**Problem solving:** Able to provide software solutions for complex scientific and business related problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
PO5	**Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions.
PO6	**Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude.
PO7	**Cooperation / Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.
PO8	**Communication Skills:** An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	**Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology.
PO10	Enhance the research culture and uphold the scientific integrity and objectivity

BHARATHIAR UNIVERSITY::COIMBATORE 641 046

B.C.A. (CBCS PATTERN)

(*For the students admitted from the academic year **2021-2022** and onwards*)

Scheme of Examination

Part	Title of the Course	Hours/ Week	Examination				Credits
			Duration in Hours	Maximum Marks			
				CIA	CEE	Total	
	Semester I						
I	Language - I	6	3	50	50	100	4
II	English - I	6	3	50	50	100	4
III	Core 1: Computing Fundamentals and C Programming	4	3	50	50	100	4
III	Core 2: Digital Fundamentalsand Computer Architecture	4	3	50	50	100	4
III	Core Lab 1: Programming Lab - C	3	3	50	50	100	4
III	Allied 1: Mathematical Structures for Computer Science	5	3	50	50	100	4
IV	Environmental Studies*	2	3	-	50	50	2
	Total	**30**		**300**	**350**	**650**	**26**
	Semester II						
I	Language – II	6	3	50	50	100	4
II	English – II	6	3	50	50	100	4
III	Core 3: C++ Programming	5	3	50	50	100	4
III	Core Lab 2: Programming Lab - C++	4	3	50	50	100	4
III	Core Lab 3: Internet Basics	2	3	25	25	50	2
III	Allied 2: Discrete Mathematics	5	3	50	50	100	4
IV	Value Education – Human Rights*	2	3	-	50	50	2
	Total	**30**		**275**	**325**	**600**	**24**
	Semester III						
III	Core 4: Data Structures	6	3	50	50	100	4
III	Core 5: Java Programming	6	3	50	50	100	4
III	Core Lab 4:Programming Lab - Java	5	3	50	50	100	4
III	Allied 3: Computer Based Optimization Techniques	6	3	50	50	100	4
III	Skill based Subject 1: WebProgramming	5	3	30	45	75	3
IV	Tamil** / Advanced Tamil* (OR) Non-major elective - I (Yoga for Human Excellence)* / Women's Rights*	2	3	-	50	50	2
	Total	**30**		**230**	**295**	**525**	**21**
	Semester IV						
III	Core 6: System Software and Operating System	6	3	50	50	100	4
III	Core 7: Linux and Shell Programming	6	3	50	50	100	4
III	Core Lab 5: Linux and Shell Programming Lab	6	3	50	50	100	4
III	Allied 4: Business Accounting	6	3	50	50	100	4
III	Skill based Subject 2 Lab: Web Programming – Lab	4	3	30	45	75	3
IV	Tamil**/Advanced Tamil* (OR) Non-major elective -II (General Awareness*)	2	3	-	50	100	2
	Total	**30**		**230**	**295**	**525**	**21**

	Semester V						
III	Core 8: RDBMS & Oracle	6	3	50	50	100	4
III	Core 9: Visual Basic	6	3	50	50	100	4
III	Core Lab 6: Programming Lab – VB & Oracle	6	3	50	50	100	4
III	Elective – I: Introduction to Compiler Design / PHP & ScriptingLanguage / PYTHON Programming	6	3	50	50	100	4
III	Skill based Subject 3: CASE Tools Concepts and Applications	6	3	30	45	75	3
	Total	**30**		**230**	**245**	**475**	**19**
	Semester VI						
III	Core 10: Graphics &Multimedia	6	3	50	50	100	4
III	Core 11: Project Work Lab %%	8	-	100	100	200	8
III	Core 7: Programming Lab – Graphics & Multimedia	3	3	50	50	100	4
III	Elective – II: Computer Networks/ Dot Net programming /Distributed Computing	5	3	50	50	100	4
III	Elective – III: Internet of Things(IoT) / Web Services / Software Testing	5	3	50	50	100	4
III	Skill Based Subject 4 : CASE Tools Lab	3	3	30	45	75	3
V	Extension Activities**	-	-	50	-	50	2
	Total	**30**		**380**	**345**	**725**	**29**
	Grand Total			**1645**	**1855**	**3500**	**140**

* No Continuous Internal Assessment (CIA). Only University Examinations.
** No University Examinations. Only Continuous Internal Assessment (CIA).


First
Semester

Course code		Computing Fundamentals and C Programming	L	T	P	C
Core/Elective/Supportive		Core Paper: 1	4	0	0	4
Pre-requisite		Students should have basic Computer Knowledge	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To impart knowledge about Computer fundamentals
2. To understand the concepts and techniques in C Programming
3. To equip and indulge themselves in problem solving using C

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Learn about the Computer fundamentals and the Problem solving	**K2**
2	Understand the basic concepts of C programming	**K2**
3	Describe the reason why different decision making and loop constructs are available for iteration in C	**K3**
4	Demonstrate the concept of User defined functions , Recursions , Scope and Lifetime of Variables, Structures and Unions	**K4**
5	Develop C programs using pointers Arrays and file management	**K3**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	Fundamentals of Computers & Problem Solving in C	12 hours

Fundamentals of Computers : Introduction – History of Computers-Generations of Computers-Classification of Computers-Basic Anatomy of a Computer System-Input Devices-Processor-Output Devices-Memory Management – Types of Software- Overview of Operating System-Programming Languages-Translator Programs-Problem Solving Techniques - Overview of C.

Unit:2	Overview of C	15 hours

Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators - Arithmetic Expressions - Evaluation of expression - precedence of arithmetic operators - Type conversion in expression – operator precedence & associativity - Mathematical functions - Reading & Writing a character - Formatted input and output.

Unit:3	Decision Making , Looping and Arrays	15 hours

Decision Making and Branching: Introduction – if, if….else, nesting of if …else statements- else if ladder – The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops. Arrays – Character Arrays and Strings

Unit:4	User-Defined Functions, Structures and Unions	15 hours

User-Defined Functions: Introduction – Need and Elements of User-Defined Functions-Definition-Return Values and their types - Function Calls – Declarations – Category of

Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - The Scope, Visibility and Lifetime of Variables- Multi file Programs. Structures and Unions		
Unit:5	**Pointers & File Management**	**15 hours**
Pointers: Introduction-Understanding pointers -Accessing the address of a variable Declaration and Initialization of pointer Variable – Accessing a variable through its pointer Chain of pointers- Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments Functions returning pointers – Pointers to Functions – Pointers and Structures. File Management in C.		
Unit:6	**Contemporary Issues**	**3 hours**
Problem Solving through C Programming - Edureka		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008
Reference Books	
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.
2	Henry Mullish & Hubert L.Cooper: The Sprit of C, Jaico, 1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Introduction to Programming in C – NPTEL
2	Problem solving through Programming in C – SWAYAM
3	C for Everyone : Programming Fundamentals – Coursera
Course Designed By:	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	L
CO2	S	M	S	M	M	L	S	L	S	L
CO3	S	S	S	M	M	M	S	M	S	M
CO4	S	S	S	M	S	M	S	M	S	M
CO5	S	S	S	M	M	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Digital Fundamentals and Computer Architecture	L	T	P	C
Core/Elective/Supportive		Core Paper : 2	4	0	-	4
Pre-requisite		Students should have basic computer knowledge	Syllabus Version	2021-22 Onwards		

Course Objectives:

On successful completion of this subject the students should have Knowledge on

1. To familiarize with different number systems and digital arithmetic & logic circuits
2. To understand the concepts of Combinational Logic and Sequential Circuits
3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure.
4. To understand the concepts of memory hierarchy and memory organization
5. To understand the various types of microprocessor architecture

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Learn the basic structure of number system methods like binary, octal and hexadecimal and understand the arithmetic and logical operations are performed by computers.	K3
2	Define the functions to simplify the Boolean equations using logic gates.	K1
3	Understand various data transfer techniques in digital computer and control unit operations.	K2
4	Compare the functions of the memory organization	K4
5	Analyze architectures and computational designs concepts related to architecture organization and addressing modes	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	Number System and Arithmetic circuits	12 hours

Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Half subtractor, Full subtractor, Parallel binary subtractor - Digital Logic: The Basic Gates – NOR, NAND, XOR Gates.

Unit:2	Combinational Logic and Sequential Circuits	14 hours

Combinational Logic Circuits: Boolean algebra – Karnaugh map – Canonical form Construction and properties – Implementations – Don't care combinations - Product of sum, Sum of products, Simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder Encoder – Shift Registers-Counters.

Unit:3	Input – Output Organization and Data Transfer	12 hours

Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking – Priority Interrupt: Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication.

Unit:4	Memory Organization	10 hours

Memory Organization: Memory Hierarchy – Main Memory- Associative memory: Hardware

Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. Virtual Memory: Address Space and Memory Space, Address Mapping Using Pages, Associative Memory, Page Table, Page Replacement.		
Unit:5	**Case Studies**	**6 hours**
CASE STUDY: Pin out diagram, Architecture, Organization and addressing modes of 80286-80386-80486-Introduction to microcontrollers.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**56 hours**

Text Book(s)	
1	Digital principles and applications, Albert Paul Malvino, Donald P Leach, TMH, 1996.
2	Computer System Architecture -M. Morris Mano , PHI.
3	Microprocessors and its Applications-Ramesh S. Goankar
Reference Books	
1	Digital Electronics Circuits and Systems, V.K. Puri, TMH.
2	Computer Architecture, M. Carter, Schaum‘s outline series, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/103/106103068/
2	http://www.nptelvideos.in/2012/12/digital-computer-organization.html
3	http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf
Course Designed By:	

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	S	M	M	L
CO2	S	M	S	M	M	S	M	M	M	L
CO3	S	S	S	M	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code		Programming Lab – C	L	T	P	C
Core/Elective/Supportive		Core Lab: 1	0	0	3	4
Pre-requisite		Students should have basic knowledge in C programming and algorithms	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming
2. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Remember and Understand the logic for a given problem and to generate Prime numbers & Fibonacci Series **(Program-1,2,3)**	**K1, K2**
2	Apply the concepts to print the Magic square, Sorting the data , Strings, Recursive functions and Pointers **(Program-4,5,6,8,10)**	**K2, K3**
3	Remember the logic used in counting the vowels in a sentence **(Program-7)**	**K1**
4	Apply and Analyze the concepts of Structures and File management **(Program-9,11,12)**	**K3&K4**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Programs	**36 hours**
1. Write a C program to find the sum, average, standard deviation for a given set of numbers.	
2. Write a C program to generate n prime numbers.	
3. Write a C program to generate Fibonacci series.	
4. Write a C program to print magic square of order n where n > 3 and n is odd.	
5. Write a C program to sort the given set of numbers in ascending order.	
6. Write a C program to check whether the given string is a palindrome or not using pointers.	
7. Write a C program to count the number of Vowels in the given sentence.	
8. Write a C program to find the factorial of a given number using recursive function.	
9. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.	
10. Write a function using pointers to add two matrices and to return the resultant matrix to the calling function.	
11. Write a C program which receives two filenames as arguments and check whether the file contents are same or not. If same delete the second file	
12. Write a program which takes a file as command line argument and copy it to another file. At the end of the second file write the total i) no of chars ii) no. of words and iii) no. of lines.	
Total Lecture hours	**36 hours**

Text Book(s)

1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008

Reference Books

1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.
2	Henry Mullish & Hubert L.Cooper: The Sprit of C, Jaico, 1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Introduction to Programming in C – NPTEL
2	Problem solving through Programming in C – SWAYAM
3	C for Everyone : Programming Fundamentals – Course
Course Designed By:	

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	L	M	S	S	S	L
CO3	S	S	S	M	L	M	S	S	S	M
CO3	S	S	S	L	L	M	S	S	S	L
CO4	S	S	S	M	L	M	S	S	S	M

*S-Strong; M-Medium; L-Low

Second Semester

Course code		C++ PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core: 3	5	0	0	4
Pre-requisite		Before starting this course one should have a basic understanding of computer programs and computer programming language. If you know the concepts of C programming it will be much easier to understand this course	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Impart knowledge of object oriented programming concepts and implement them in C++
2. Enable to differentiate procedure oriented and object-oriented concepts.
3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.
4. Explain the importance of data hiding in object oriented programming

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Define the different programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO methodology	K1
2	Illustrate and model real world objects and map it into programming objects for a legacy system.	K2
3	Identify the concepts of inheritance and its types and develop applications using overloading features.	K3
4	Discover the usage of pointers with classes	K4
5	Explain the usage of Files, templates and understand the importance of exception Handling	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	INTRODUCTION TO C++	10 hours

Key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If.. Else, jump, goto, break, continue, Switch case statements - Loops in C++: for, while, do - functions in C++ - inline functions – Function Overloading..

Unit:2	CLASSES AND OBJECTS	10 hours

Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.

Unit:3	OPERATOR OVERLOADING	12 hours

Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path

inheritance – Virtual base Classes – Abstract Classes.		
Unit:4	**POINTERS**	**13 hours**
Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.		
Unit:5	**FILES**	**13 hours**
File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Book(s)

1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.

Reference Books

1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.
2	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.
3	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://www.spoken-tutorial.org
2	https://www.tutorialspoint.com/cplusplus/index.htm
3	https://www.w3schools.com/cpp/

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

*S-Strong; M-Medium; L-Low

Course code		PROGRAMMING LAB - C++	L	T	P	C
Core/Elective/Supportive		Core Lab : 2	0	0	4	4
Pre-requisite		Basic understanding of computer programs and computer programming language like C.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Impart knowledge of object oriented programming concepts and implement them in C++
2. Enable to differentiate procedure oriented and object-oriented concepts.
3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.
4. Explain the importance of data hiding in object oriented programming

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Define the different programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO methodology	K1
2	Illustrate and model real world objects and map it into programming objects for a legacy system.	K2
3	Identify the concepts of inheritance and its types and develop applications using overloading features.	K3
4	Discover the usage of pointers with classes	K4
5	Explain the usage of Files, templates and understand the importance of exception Handling	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Programs	**36 hours**

1. Write a C++ Program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH() to insert an element and member function POP() to delete an element check for overflow and underflow conditions..
2. Write a C++ Program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD (), SUB(), MUL(), DIV() to perform addition, subtraction, multiplication, division respectively. Write a member function to get and display values.
3. Write a C++ Program to read an integer number and find the sum of all the digits until it reduces to a single digit using constructors, destructors and inline member functions.
4. Write a C++ Program to create a class FLOAT that contains one float data member. Overload all the four Arithmetic operators so that they operate on the object FLOAT
5. Write a C++ Program to create a class STRING. Write a Member Function to initialize, get and display stings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.
6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, Grade. Write a member function to get and display them.

	Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade.
7.	Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGE from class Shape and Calculate Area and Perimeter of each class separately and display the result.
8.	Write a C++ Program to create two classes each class consists of two private variables, a integer and a float variable. Write member functions to get and display them. Write a FRIEND Function common to both classes, which takes the object of above two classes as arguments and the integer and float values of both objects separately and display the result.
9.	Write a C++ Program using Function Overloading to read two Matrices of different Data Types such as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually.
10.	Write a C++ Program to check whether the given string is a palindrome or not using Pointers
11.	Write a C++ Program to create a File and to display the contents of that file with line numbers.
12.	Write a C++ Program to merge two files into a single file.
Text Book(s)	
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.
Reference Books	
1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.
2	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.
3	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	
Course Designed By:	

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

Course code		Internet Basics	L	T	P	C
Core/Elective/Supportive		Core Lab : 3	0	0	2	2
Pre-requisite		Knowledge of WINDOWS Operating Systems	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Introduce the fundamentals of Internet and the Web functions.
2. Impart knowledge and essential skills necessary to use the internet and its various components.
3. Find, evaluate, and use online information resources.
4. Use Google Apps for education effectively.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the fundamentals of Internet and the Web concepts	K2
2	Explain the usage of internet concepts and analyze its components.	K2
3	Identify and apply the online information resources	K3
4	Inspect and utilize the appropriate Google Apps for education effectively	K3, K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Programs	**36 hours**
1. Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly.	
2. Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.	
3. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.	
4. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.	
5. Create a label and upload bulk contacts using import option in Google Contacts.	
6. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.	
7. Create and share a folder in Google Drive using ‘share a link’ option and set the permission to access that folder by your friends only.	
8. Create one page story in your mother tongue by using voice recognition facility of Google docs.	
9. Create a registration form for your Department Seminar or Conference using Google Forms.	
10. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.	
11. Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after submission.	

12. Create a meet using Google Calendar and record the meet using Google Meet.	
13. Create a Google slides for a topic and share the same with your friends.	
14. Create template for a seminar certificate using Google Slides.	
15. Create a sheet to illustrate simple mathematical calculations using Google Sheets.	
16. Create student's internal mark statement and share the Google sheets via link.	
17. Create different types of charts for a range in CIA mark statement using Google Sheets.	
18. Create a mark statement in Google Sheets and download it as PDF, .xls and .csv files.	
Text Book(s)	
1	Ian Lamont, Google Drive & Docs in 30 Minutes, 2nd Edition.
2	
Reference Books	
1	Sherry Kinkoph Gunter, My Google Apps, 2014.
2	
3	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=NzPNk44tdlQ
2	https://www.youtube.com/watch?v=PKuBtQuFa-8
4	https://www.youtube.com/watch?v=hGER1hP58ZE
Course Designed By:	

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	S	S	S	M	M	S	L
CO2	S	M	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Third Semester

Course code		Data Structures	L	T	P	C
Core/Elective/Supportive		Core: 4	6	0	0	4
Pre-requisite		Basic understanding of Data storage, retrieval and algorithms.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To introduce the fundamental concept of data structures
2. To emphasize the importance of data structures in developing and implementing efficient algorithms.
3. Understand the need for Data Structures when building application
4. Ability to calculate and measure efficiency of code
5. Improve programming logic skills.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of data structures and algorithms	K1-K2
2	Construct and analyze of stack and queue operations with illustrations	K2-K4
3	Enhance the knowledge of Linked List and dynamic storage management.	K2-K3
4	Demonstrate the concept of trees and its applications	K2-K3
5	Design and implement various sorting and searching algorithms for applications and understand the concept of file organizations	K1-K4

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	INTRODUCTION	15 hours

Introduction of Algorithms, Analysing Algorithms. Arrays: Sparse Matrices – Representation of Arrays. Stacks and Queues. Fundamentals – Evaluation of Expression Infix to Postfix Conversion – Multiple Stacks and Queues

Unit:2	LINKED LIST	12 hours

Linked List: Singly Linked List – Linked Stacks and Queues – Polynomial Addition- More on Linked Lists – Sparse Matrices – Doubly Linked List and Dynamic – Storage Management – Garbage Collection and Compaction.

Unit:3	TREES	15 hours

Basic Terminology – Binary Trees – Binary Tree Representations – Binary Trees-Traversal-More On Binary Trees – Threaded Binary Trees – Binary Tree. Representation of Trees – Counting Binary Trees. Graphs: Terminology and Representations-Traversals, Connected Components and Spanning Trees, Shortest Paths and Transitive Closure

Unit:4	EXTERNAL SORTING	15 hours

Storage Devices –Sorting with Disks: K-Way Merging – Sorting with Tapes Symbol Tables: Static Tree Tables – Dynamic Tree Tables – Hash Tables: Hashing Functions – Overflow Handling.

Unit:5	INTERNAL SORTING	15 hours
Insertion Sort – Quick Sort – 2 Way Merge Sort – Heap Sort – Shell Sort – Sorting on Several Keys. Files: Files, Queries and Sequential organizations – Index Techniques –File Organizations.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia Publication.
2	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, Computer Algorithms, Galgotia Publication.
3	S.Lovelyn Rose, R.Venkatesan, Data Structures, Wiley India Private Limited,2015, 1st Edition

Reference Books	
1	Jean-Paul,Tremblay & Paul G.Sorenson , An Introduction to Data structures with Applications Tata McGraw Hill Company 2008, 2ndEdition.
2	Samanta.D , Classic Data Structure Prentice Hall of India Pvt Ltd 2007, 9th Edition
3	Seymour Lipschutz, Data Structures McGraw Hill Publications, 2014, 1st Edition

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	

Course Designed By:

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	S	M	M	M
CO2	S	S	S	M	M	M	M	M	M	M
CO3	S	S	S	M	S	M	M	M	S	S
CO4	S	S	S	M	S	S	S	S	M	M
CO5	S	S	S	M	M	S	S	M	M	S

*S-Strong; M-Medium; L-Low

Course code		Java Programming	L	T	P	C
Core/Elective/Supportive		Core: 5	6	0	0	4
Pre-requisite		Students Should have the basic understanding of oops concept.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To expose the students with the introduction to OOPs and advantages of object oriented programming.
2. The concepts of OOPs make it easy to represent real world entities.
3. The course introduces the concepts of converting the real time problems into objects and methods and their interaction with one another to attain a solution.
4. Simultaneously it provides the syntax of programming language Java for solving the real world problems.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	The competence and the development of small to medium sized application programs that demonstrate professionally acceptable coding	K1-K2
2	Demonstrate the concept of object oriented programming through Java	K2-K4
3	Apply the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program	K3
4	Develop java programs for applets and graphics programming	K3
5	Understand the fundamental concepts of AWT controls, layouts and events	K1-K2

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING	15 hours

Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming –Application of Object-Oriented Programming. Java Evolution: History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine.

Unit:2	BRANCHING AND LOOPING	12 hours

Constants, Variables, Data Types – Operators and Expressions – Decision Making and Branching: if, if...else, nested if, switch, ? : Operator – Decision Making and Looping: while, do, for – Jumps in Loops – Labeled Loops – Classes, Objects and Methods.

Unit:3	ARRAYS AND INTERFACES	15 hours

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.

Unit:4	ERROR HANDLING	15 hours

Managing Errors and Exceptions – Applet Programming – Graphics Programming.

Unit:5	**MANAGING INPUT / OUTPUT FILES IN JAVA**	**15 hours**
Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive data Types – Random Access Files.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Programming with Java – A Primer – E. Balagurusamy, 5th Edition, TMH.
2	Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10th Edition, 2018
3	Programming with Java – A Primer – E. Balagurusamy, 3rd Edition, TMH.
Reference Books	
1	The Complete Reference Java 2 – Patrick Naughton & Hebert Schildt, 3rd Edition, TMH
2	Programming with Java – John R. Hubbard, 2nd Edition, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	www.spoken-tutorial.org
2	www.nptel.ac.in
3	https://www.w3schools.in/java-tutorial/
Course Designed By:	

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	L	S	M	M	M
CO2	S	S	S	M	S	L	S	M	M	M
CO3	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	M	S	M	M	S	M	M
CO5	S	S	S	M	S	M	S	S	M	M

*S-Strong; M-Medium; L-Low

Course code		Programming Lab – JAVA	L	T	P	C
Core/Elective/Supportive		Core Lab: 4	0	0	5	4
Pre-requisite		Students should know about the OOPs concept and basic knowledge in java theory.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

3. The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.
4. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming
5. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding	**K1, K2**
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping	**K2**
3	Create data files and Design a page using AWT controls and Mouse Events in Java programming Implement the concepts of code reusability and debugging.	**K2, K3**
4	Develop applications using Strings, Interfaces and Packages and applets	**K3**
5	Construct Java programs using Multithreaded Programming and Exception Handling	**K3**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Programs	**36 hours**

1. Write a Java Applications to extract a portion of a character string and print the extracted string.
2. Write a Java Program to implement the concept of multiple inheritance using Interfaces.
3. Write a Java Program to create an Exception called payout-of-bounds and throw the exception.
4. Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.
5. Write a Java Program to draw several shapes in the created windows.
6. Write a Java Program to create a frame with four text fields name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its corresponding values are to be appeared in the text fields.
7. Write a Java Program to demonstrate the Multiple Selection List-box.
8. Write a Java Program to create a frame with three text fields for name, age and qualification and a text field for multiple line for address
9. Write a Java Program to create Menu Bars and pull down menus.
10. Write a Java Program to create frames which respond to the mouse clicks. For each events with mouse such as mouse up, mouse down, etc., the corresponding message to be

displayed.		
11. Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click positions.		
12. Write a Java Program which open an existing file and append text to that file.		
	Total Lecture hours	**36 hours**
Text Book(s)		
1	Programming with Java – A Primer – E. Balagurusamy, 5th Edition, TMH.	
2	Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10th Edition, 2018	
3	Programming with Java – A Primer – E. Balagurusamy, 3rd Edition, TMH.	
Reference Books		
1	The Complete Reference Java 2 – Patrick Naughton & Hebert Schildt, 3rd Edition, TMH	
2	Programming with Java – John R. Hubbard, 2nd Edition, TMH.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.w3resource.com/java-exercises/	
2	https://www.udemy.com/introduction-to-java-programming/	
3		
Course Designed By:		

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	S	S	S	M	M	L
CO2	S	S	S	L	S	M	S	M	M	L
CO3	S	S	S	M	S	M	S	M	M	L
CO4	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	M	S	S	S	S	M	S

*S-Strong; M-Medium; L-Low

Course code		Web Programming	L	T	P	C
Core/Elective/Supportive		Skill based Subject – 1	5	0	0	3
Pre-requisite		Students should have basic knowledge on internet and world wide web.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To enhance the knowledge of students in web programming
2. To learn about the scripting languages HTML and its elements
3. To understand concept of DHTML to integrate dynamic web pages
4. To understand XML, CSS and XSL for formatting the web pages

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Internet, WWW, browsers and Email and protocols.	K1
2	Understand and apply the HTML, HTML elements and formatting styles	K1-K3
3	Knowledge on creating tables, forms and DHTML	K3
4	Understand the structure of XML document, DTD and Schema	K1-K3
5	Knowledge on working with SML, Style sheets and XSL	K1-K4

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	Introducation to Internet	15 hours

Introduction to Internet – World Wide Web – Browsers: Introduction – Popular Web Browsers – know your browsers – Electronic Mail : Introduction – E-mail networks and servers – E-mail protocols – Structure of an E-mail.

Unit:2	HTML	12 hours

HTML : Introduction – Getting started – Creating and saving an HTML document – Document Layout of HTML Page – HTML elements – Some other formatting Styles – Hypertext Links.

Unit:3	HTML & DHTML	15 hours

HTML (contd) : URLs – Images – HTML tables – Forms – Special Characters – Metatages. Interactivity Tools and Multimedia : Introduction – DHTML – Scripting Languages – Java – ASP.

Unit:4	XML basics and DTD	15 hours

XML :XML basics – Introduction – need for XML – Advantages – Working with an XML Document – Structure of an XML Document – DTD- XML Schema.

Unit:5	XML Schema and XSL	15 hours

XML (contd) : Working with XML Schema – Declaring Attributes – XML namespaces – Reusing Schema Components – Grouping elements and attributes. XML Style sheets : Introduction – CSS – eXtensible Style Sheet language – Formatting Data based on controls – Displaying data in a Tabular Format.

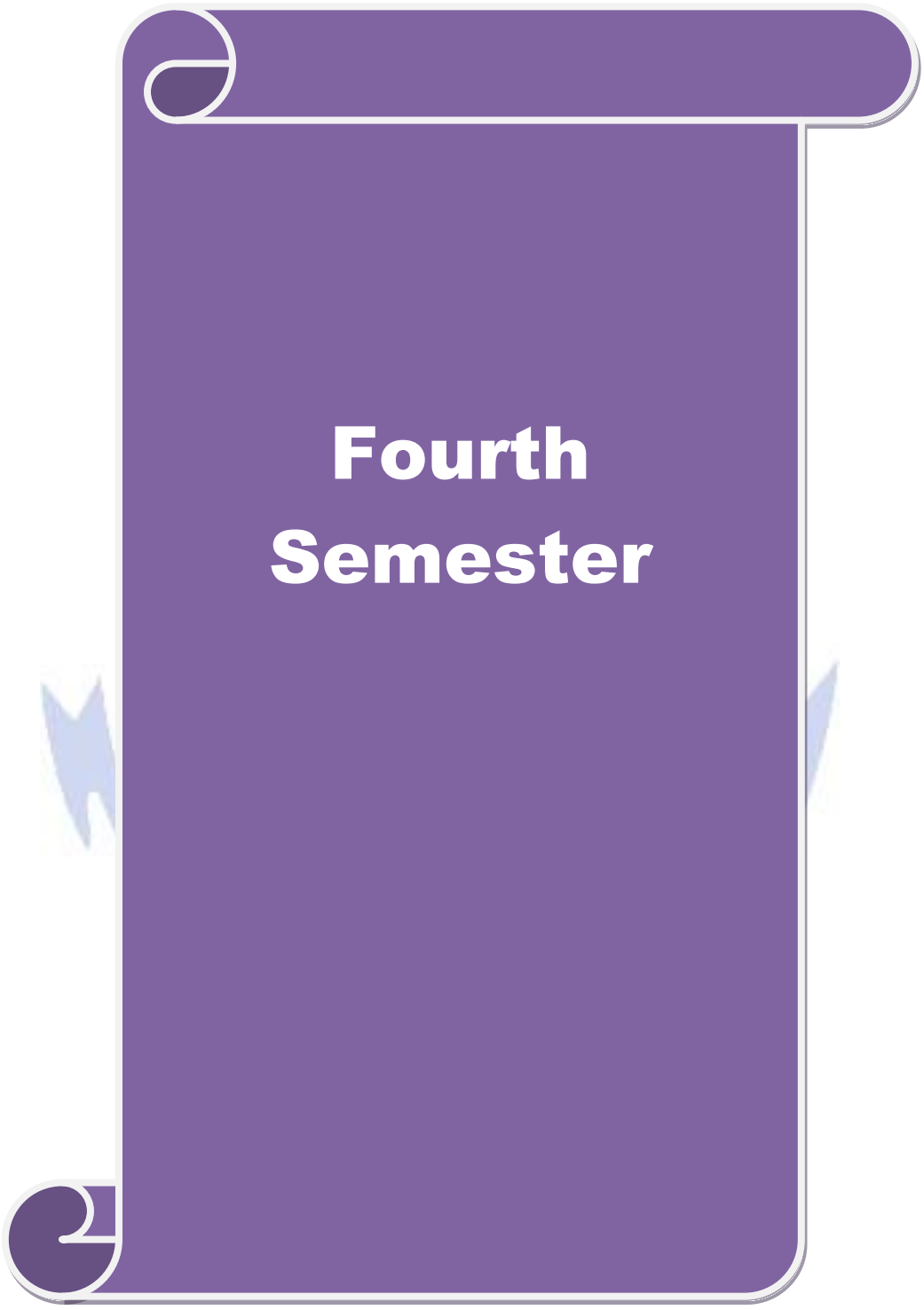
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Internet and Web Design, ITL Education, Macmillan India Ltd.
2	HTML and XML an Introduction, NIIT, Prentice Hall of India Pvt. Ltd
3	
Reference Books	
1	World Wide Web Design with HTML, C. Xavier, 2007, TMH.
2	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	
Course Designed By:	

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	L
CO2	L	M	S	M	M	L	S	L	S	L
CO3	S	S	L	M	M	M	S	M	S	M
CO4	S	M	S	M	S	M	S	M	S	M
CO5	M	S	S	M	M	M	S	M	S	M

*S-Strong; M-Medium; L-Low


Fourth
Semester

Course code		System Software and Operating Systems	L	T	P	C
Core/Elective/Supportive		Core : 6	6	0	0	4
Pre-requisite		Students Should have the basic knowledge in computer.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand the processing of programs on a computer system to design and implementation of language processor.
2. To enhance the ability of program generation through expansion and gain knowledge about Code optimization using software tools.
3. Students will gain knowledge of basic operating system concepts.
4. To have an in-depth understanding of process concepts, deadlock and memory management.
5. To provide an exposure to scheduling algorithms, devices and information management.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Know the program generation and program execution activities in detail	K1
2	Understand the concepts of Macro Expansions and Gain the knowledge of Editing processes	K2-K3
3	Remember the basic concepts of operating system	K1
4	Understand the concepts like interrupts, deadlock , memory management and file management	K2
5	Analyze the need for scheduling algorithms and implement different algorithms used for representation, scheduling, and allocation in DOS and UNIX operating system.	K1-K4

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	INTRODUCTION TO SYSTEM SOFTWARE	12 hours

Introduction–System Software and machine architecture. Loader and Linkers: Basic Loader Functions – Machine dependent loader features –Machine independent loader features – Loader design options

Unit:2	MACHINE AND COMPILER	15 hours

Machine dependent compiler features – Intermediate form of the program – Machine dependent code optimization – Machine independent compiler features – Compiler design options – Division into passes – Interpreters – p-code compilers – Compiler-compilers.

Unit:3	OPERATING SYSTEM	15 hours

What is an Operating System? – Process Concepts: Definition of Process – Process States – Process States Transition – Interrupt Processing – Interrupt Classes – Storage Management: Real Storage: Real Storage Management Strategies – Contiguous versus Non-contiguous storage allocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming – Variable partition multiprogramming.

Unit:4	VIRTUAL STORAGE	15 hours

Virtual Storage: Virtual Storage Management Strategies – Page Replacement Strategies – Working Sets – Demand Paging – Page Size. Processor Management: Job and Processor Scheduling: Preemptive Vs Non-preemptive scheduling – Priorities – Deadline scheduling.		
Unit:5	**DEVICE AND INFORMATION MANAGEMENT**	**15 hours**
Device and Information Management Disk Performance Optimization: Operation of moving head disk storage – Need for disk scheduling – Seek Optimization – File and Database Systems: File System – Functions – Organization – Allocating and freeing space – File descriptor – Access control matrix.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Leland L.Beck, System Software: An Introduction to Systems Programming, Pearson, Third Edition.
2	H.M. Deitel, Operating Systems, 2nd Edition, Perason, 2003.

Reference Books

1	Achy8ut S. Godbole, Operating Systems, TMH, 2002.
2	John J. Donovan, Systems Programming, TMH, 1991.
3	D.M. Dhamdhere, Systems Programming and Operating Systems, 2nd Revised Edition, TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	
2	
3	

Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	M	L
CO2	S	S	S	S	S	M	M	M	S	L
CO3	S	M	M	M	S	M	S	S	S	L
CO4	S	S	S	M	S	S	S	M	M	M
CO5	S	S	S	M	S	S	S	M	M	M

*S-Strong; M-Medium; L-Low

Course code		Linux and Shell Programming	L	T	P	C
Core/Elective/Supportive		Core : 7	6	0	0	4
Pre-requisite		Before starting the course students should have the basic knowledge about operating system and C programming.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Linux is a multi-user and multi-tasking operating system and after learning the concepts of an operating system
2. Student will be able to write simple shell programming using Linux utilities, pipes and filters.
3. The file system, process management and memory management are discussed.
4. Various commands used by Linux shell is also discussed which makes the users to interact with each other.
5. Bourne shell programming is dealt in depth which can be used to develop applications.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Describe the architecture and features of Linux Operating System and distinguish it from other Operating System.	K1
2	Develop Linux utilities to perform File processing, Directory handling, User Management and display system configuration	K2-K3
3	Develop shell scripts using pipes, redirection, filters and Pipes	K2
4	Apply and change the ownership and file permissions using advance Unix commands.	K3
5	Build Regular expression to perform pattern matching using utilities and implement shell scripts for real time applications.	K3-K6

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	INTRODUCTION	12 hours

Introduction to LINUX Operating System: Introduction – The LINUX Operating System.

Unit:2	MANAGING FILES AND DIRECTORIES	15 hours

Managing Files and Directories: Introduction – Directory Commands in LINUX – File Commands in LINUX.

Unit:3	VI EDITOR	15 hours

Creating files using the vi editor: Text editors – The vi editor. Managing Documents: Locating files in LINUX – Standard files – Redirection – Filters – Pipes.

Unit:4	SECURING FILES	15 hours

Securing files in LINUX: File access permissions – viewing File access permissions – Changing File access permissions. Automating Tasks using Shell Scripts: Introduction – Variables- Local and Global Shell variables – Command Substitution.

Unit:5	CONDITIONAL EXECUTION IN SHELL SCRIPTS	15 hours
Using Conditional Execution in Shell Scripts: Conditional Execution – The case…esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts – The while construct – until construct – for construct – break and continue commands – Simple Programs using Shell Scripts.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition.
2	N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications, 2008, 1st Edition

Reference Books	
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://spoken-tutorial.org/
2	https://www.tutorialspoint.com/linux/index.htm
3	

Course Designed By:

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	M	M	S	M	M	M	M	L
CO2	S	S	S	M	S	M	M	M	M	L
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code		Programming Lab – LINUX and SHELL PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core Lab: 5	0	0	6	4
Pre-requisite		Students should have the prior basic knowledge in operating system.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Describe the architecture and features of Linux Operating System
2. To create programs in the Linux environment using Linux utilities and commands.
3. Student is given an introduction of Linux shell commands and they will be able to write own shell scripts.
4. Shell programming is dealt in depth which can be used to develop applications.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Develop Linux utilities to perform File processing, Directory handling and User Management	**K1, K2**
2	Understand and develop shell scripts using pipes, redirection, filters, Pipes and display system configuration	**K2-K3**
3	Develop simple shell scripts applicable to file access permission network Administration	**K3**
4	Apply and change the ownership and file permissions using advance Unix commands.	**K4-K5**
5	Create shell scripts for real time applications.	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Programs	**36 hours**

1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration :
   a. currently logged user and his log name
   b. current shell , home directory , Operating System type , current Path setting , current working directory
   c. show currently logged number of users, show all available shells
   d. show CPU information like processor type , speed
   e. show memory information
3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current date, user name, file listing and directories by getting user choice.
5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.
9. Write a shell script for palindrome checking.

10. Write a shell script to print the multiplication table of the given argument using for loop.		
	Total Lecture hours	**36 hours**
Text Book(s)		
1	Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition.	
2	N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications, 2008, 1st Edition	
Reference Books		
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.w3resource.com/linux-exercises/	
2	http://spoken-tutorial.org/	
3		
Course Designed By:		

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	S	M	M	M
CO3	S	S	S	M	S	M	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code		Lab – Web Programming	L	T	P	C
Core/Elective/Supportive		Skill Based Subject 2 (Lab) :1	0	0	4	3
Pre-requisite		Basic knowledge in internet and basic of html.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To gain knowledge about how to develop web applications
2. To create web applications using HTML
3. To create web applications using HTML with Style sheets
4. To design interactive web sites with all the features given in Web programming

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the problems and create applications in basics of web programming	**K2-K4, K6**
2	Understand and develop Web pages with formatting styles.	**K2-K3**
3	Apply the features in HTML to present the details given	**K3**
4	Analyze the problem, apply the concept for developing applications	**K4-K5**
5	Create web sites of real time applications	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Programs	**36 hours**

1. Develop a HTML document which displays you name as <h1> heading and displays any four of your friends. Each of your friend's names must appear as hot text. When you click your friend's name, it must open another HTML document, which tells about your friend.
2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.
3. Design a HTML document describing you. Assign a suitable background design and background color and a text color.
4. Develop a HTML document to print the following: Who can use the solar heaters? Anybody with a regular hot water demand. In houses for domestic purposes (cooking, bathing and washing). □□For engineering / chemical industries, dairies and textile/leather process plants, to –preheat boiler feed water. For hostels, hospitals, guest houses and industrial canteens. □□For food-processing plants and for process applications.
5. Write a HTML document to print the following: The family has the following facilities: 1. Own House Living area 2400 square feet, Separate bungalow, Car shed, 2 Car Maruti Esteem, Registration Number TN 38 A 9650, 1996 Model, Farm, 35 acres Coconut Groves, 10 acres Mango Groves.
6. Write a HTML document to print your class Time Table.
7. Develop a Complete Web Page using Frames and Framesets which gives the Information

about a Hospital using HTML.		
8. Write a HTML document to print your Bio-Data in the following format: NAME Religion Community Street Town District State Address PIN Code Office Phone Residence Mobile Educational Qualification Degree University/Institute Month& year Grade / Mark		
9. Develop complete set of web pages to describe you skills in various areas using HTML.		
10. Develop a web site to publish your family and the details of each member using HTML.		
11. Develop a HTML document to display a Registration Form for an inter-collegiate function.		
12. Develop a HTML document to design Alumni Registration form of your college.		
	Total Lecture hours	**36 hours**
Text Book(s)		
1	Internet and Web Design, ITL Education, Macmillan India Ltd.	
2	HTML and XML an Introduction, NIIT, Prentice Hall of India Pvt. Ltd	
Reference Books		
1	World Wide Web Design with HTML, C. Xavier, 2007, TMH.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
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Course Designed By:		

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	L	M	M	M
CO3	L	S	M	M	S	M	S	S	M	M
CO3	S	M	S	S	M	S	S	M	S	S
CO4	M	S	S	S	M	S	M	S	S	L
CO5	S	M	L	S	S	M	S	S	M	S

Fifth Semester

Course code		RDBMS & Oracle	L	T	P	C
Core/Elective/ Supportive		Core : 8	6	0	0	4
Pre-requisite		Basic knowledge about the data, table and database in computers	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. The course describes the data, organizing the data in database, database administration.
2. To grasp the different issues involved in the design of a database system.
3. To study the physical and logical database designs and database modeling like relational, Hierarchical, network models, database security, integrity and normalization.
4. It also gives introduction to SQL language to retrieve the data from the database with suitable application development.
5. Provide strong foundation of database concepts and to introduce students to application development in DBMS.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Relational Data Model, Entity-Relationship Model and process of Normalization	**K1-K2**
2	Understand and construct database using Structured Query Language (SQL) in Oracle9i environment.	**K1-K3**
3	Learn basics of PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions.	**K1-K4**
4	Understand and use built-in functions and enhance the knowledge of handling multiple tables	**K1-K3**
5	Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	DATABASE CONCEPTS	15 hours

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – De –normalization – Another Example of Normalization.

Unit:2	ORACLE9i	15 hours

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.

Unit:3	WORKING WITH TABLE	15 hours

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.		
Unit:4	**PL/SQL**	**15 hours**
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 – SQ L 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.		
Unit:5	**PL/SQL COMPOSITE DATA TYPES**	**12 hours**
PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Database Systems using Oracle, Nilesh Shah, 2nd edition, PHI.
2	E-Book : Diana Lorentz, “Oracle® Database SQL Reference”, ORACLE, Dec, 2005.
3	E-Book : Bill Pribyl, Steven Feuerstein, “Oracle PL/SQL Programming”, O’Reilly Media, Inc., 6th Edition, February 2014.
Reference Books	
1	Database Management Systems, Majumdar & Bhattacharya, 2007, TMH.
2	Database Management Systems, Gerald V. Post, 3rd edition, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://www.digimat.in/nptel/courses/video/106105175/L01.html
2	https://www.tutorialspoint.com/oracle_sql/index.htm
Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	M	M	M	L
CO2	S	S	S	M	S	M	M	M	M	L
CO3	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	S	S	M	S	S	M	L
CO5	S	S	S	S	S	M	S	S	M	L

*S-Strong; M-Medium; L-Low

Course code		Visual Basic	L	T	P	C
Core/Elective/Supportive		Core : 9	6	0	0	4
Pre-requisite		Knowledge in programming language and oops concept.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. The main aim of the course is to cover visual basic programming skills required for modern software development.
2. To study the advantages of Controls available with visual basic.
3. To gain a basic understanding of database access and management using data controls.
4. To facilitate the learner to carry out project works using the tools available in VB and MS Access.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Demonstrate fundamental skills in utilizing the tools of a visual environment such as command, menus and toolbars.	**K1**
2	Implement SDI and MDI applications using forms, dialogs and other types of GUI components.	**K2**
3	Understand the connectivity between VB with MS-ACCESS database.	**K3**
4	Implement the methods and techniques to develop projects.	**K4**
5	Attain a good practical skill of managing ODBC and Data Access Objects	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	INTRODUCTION TO VB	15 hours

Getting Started with VB6, Programming Environment, working with Forms, Developing an application, Variables, Data types and Modules, procedures and control structures, arrays. Working with Controls: Creating and using controls, working with control arrays.

Unit:2	MENUS IN VB	15 hours

Menus, Mouse events and Dialog boxes: Mouse events, Dialog boxes, MDI and Flex grid: MDI, Using the Flex grid control.

Unit:3	ODBC AND DATA ACCESS OBJECTS	15 hours

ODBC and Data Access Objects: Data Access Options, ODBC, Remote data objects, ActiveX EXE and ActiveX DLL: Introduction, Creating an ActiveX EXE Component, Creating ActiveX DLL Component.

Unit:4	OBJECT LINKING AND EMBEDDING	15 hours

Object Linking and Embedding: OLE fundamentals, Using OLE Container Control, Using OLE Automation objects, OLE Drag and Drop, File and File System Control: File System Controls, Accessing Files.

Unit:5	CONTROLS IN VB	12 hours

Additional controls in VB: sstab control, setting properties at runtime, adding controls to tab, list control, tabstrip control, MS Flexgrid control, Why ADO, Establishing a reference, Crystal and

Data reports.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. **(Unit I to Unit IV)**
2	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006. **(Unit V)**
Reference Books	
1	Gray Cornell (2003), "Visual Basic 6 from ground up" TMH, New Delhi, 1st Edition,
2	Deitel and Deitel, T.R.Nieto (1998), "Visual Basic 6 – How to Program", Pearson Education. First Edition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	M	M	M	M	M	L
CO2	S	S	S	M	M	M	S	S	M	L
CO3	S	S	S	S	S	M	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code		Programming Lab – VB & Oracle	L	T	P	C
Core/Elective/Supportive		Core Lab : 6	0	0	6	4
Pre-requisite		Students should have the theoretical knowledge in visual basic and oops concept.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To develop applications using Graphical User Interface tools.
2. To understand the design concepts.
3. To design and build database systems and demonstrate their competence.
4. To create requirement analysis and specification for software applications.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concepts of Visual Basic.	**K1**
2	Learn the advantages of Controls in VB	**K2**
3	Design and develop the event- driven applications using Visual Basic framework.	**K3**
4	Apply the knowledge of database methods.	**K4**
5	Learn basics of PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Programs	**36 hours**

1. Construction of an Arithmetic Calculator (Simple).
2. Writing simple programs using loops and decision-making statements.
   a. Generate Fibonacci series.
   b. Find the sum of N numbers.
3. Write a program to create a menu and MDI Forms.
4. Write a program to display files in a directory using DriveListBox, DirListBox and FileListBox control and open, edit and save text file using Rich text box control.
5. Write a program to illustrate Common Dialog Control and to open, edit and save text file.
6. Write a program to implement animation using timers.
7. Write a simple VB program to accept a number as input and convert it into
   a. Binary b. Octal c. Hexa-decimal
8. Create a table for Employee details with Employee Number as primary key and following fields:
   Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping operators.
9. Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block.

10. Write a PL/SQL program to implement the concept of Triggers		
11. Write a PL/SQL program to implement the concept "Procedures".		
12. Write a VB program to manipulate the student mark list with oracle database connectivity program.		
	Total Lecture hours	**36 hours**

Text Book(s)	
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. **(Unit I to Unit IV)**
2	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006. **(Unit V)**
3	E-Book : Bill Pribyl, Steven Feuerstein, "Oracle PL/SQL Programming", O'Reilly Media, Inc., 6th Edition, February 2014.
Reference Books	
1	Gray Cornell (2003), "Visual Basic 6 from ground up" TMH, New Delhi, 1st Edition,
2	Deitel and Deitel, T.R.Nieto (1998), "Visual Basic 6 – How to Program", Pearson Education. First Edition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	L	M	L	S	M	M	L
CO3	S	S	S	L	M	M	S	M	S	L
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	S	M	M
CO5	S	S	S	S	S	S	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code		Introduction to Compiler Design	L	T	P	C
Core/Elective/Supportive		Elective : I	6	0	0	4
Pre-requisite		Basic knowledge in translators, compilation of high level language programming	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand the use of translators and compiler
2. To enable students to learn the phases of a compiler
3. To familiar with context free grammars, regular expressions and parsing techniques
4. To learn about the intermediate codes in translation
5. To enable the students to learn about code generations

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the use of translators and complier, structure of a compiler	**K1**
2	Understand and apply the context free grammars and parsing techniques	**K1-K4**
3	Understand and remember the syntax directed translations, intermediate codes	**K2**
4	Understand the run time storage schems, error detection and recovery	**K3**
5	Understand and apply knowledge on code optimization and code generator	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	Introduction to Compilers	15 hours

Introduction to Compliers: Compliers and Translator – Need of Translator – The structure of a Complier – Lexical analysis – Syntax analysis – Intermediate code generation – optimization – code generation – Complier – writing tools. Finite automata and lexical Analysis: The role of the lexical analysis – A simple approach to the design of lexical analyzers- Regular expressions to finite automata – Minimizing the number of states of a DFA.

Unit:2	Syntactic programming languages and Parsing Techniques	15 hours

The Syntactic specification of programming languages: context free grammars – derivations and parse trees – capabilities of context free grammars. Basic parsing techniques: Parsers – shift – reduce parsing – operator – precedence parsing – top down parsing – predictive parsers.

Unit:3	Syntax directed Translation and Symbol Table	15 hours

Syntax – directed translation: syntax – directed translation schemes – implementation of syntax – directed translators – intermediate code – postfix notation – parse trees and syntax trees – 3 address code – quadruples and triples – translation of assignment statements – Boolean expressions – statements that alter the flow of control. Symbol tables: the contents of a symbol table – data structures for symbol table – representing scope information.

Unit:4	Storage allocation and Error detection and recovery	15 hours

Run time storage administration: Implementation of a simple stack allocation scheme – implementation of block-structured languages – storage allocation in block structured languages. Error deduction and recovery: errors – lexical phase errors – syntactic phase errors – semantic

errors.		
Unit:5	**Code Optimization and Generation**	**12 hours**
Introduction of code optimization: The principle sources of optimization – loop optimization – the DAG representation of basic blocks – value numbers and algebraic laws – Global data flow analysis. Code generation: Object programs – problems in code generation – a machine model – a simple code generator – register allocation and assignment – code generation from DAGs – peepholes optimization.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Principles of Complier Design, Alfred V.Aho, Jeffrey D.Ullman, Narosa Publishing House.

Reference Books

1	Steven S. Muchnick, "Advanced Compiler Design and Implementation", Morgan Kaufmann Publishers an imprint of Elsevier 2014.
2	
3	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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3	

Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	M	M	M	M	M	L
CO2	M	S	M	M	M	M	S	S	M	L
CO3	S	M	S	S	S	M	S	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	L	S	M	M	S	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code		PHP & Scripting Languages	L	T	P	C
Core/Elective/Supportive		Elective : I	6	0	0	4
Pre-requisite		Basic knowledge on HTML and CSS and OOPs concept.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand the scripting languages used while developing web applications
2. To enable students to learn VB script and Java script for implementing event procedures.
3. To familiar SSI and Cookies and plugins
4. To learn about the server side scripting language to build web applications
5. To enable the students to learn how to build applications in PHP with database.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basics of .VB script and Java script	**K1**
2	Understand the I/O handling, data validation, Activex control and validation	**K2**
3	Understand and remember the java script objects, form validations, cookies and plugins	**K2**
4	Understand the sever side scripting language basics	**K3**
5	Knowledge on PHP objects, cookies, connecting remote files, and database connections	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	Introduction to .NET Framework	15 hours

VB Script and Java Script: Language structure – control structure – Procedures and functions – Error handling.

Unit:2	File I/O, Object Oriented Concepts and Message Queues	15 hours

VB Script: Input & Output – Data Validation –Integration with Forms – Activex Control & Scripting

Unit:3	VB.NET IDE and Controls	15 hours

Java Script: Form Validation – SSI and Cookies – Frames and Windows – MIME Types – Plugins

Unit:4	VB.NET & ASP.NET	15 hours

PHP: Server side scripting Language: Basic syntax – Types – Variables – Constants – Expressions – Operators – Control Structures.

Unit:5	Web Services	12 hours

PHP: Functions – Classes and Objects – HTML forms – HTTP authentication with PHP – Cookies – Handling file uploads – Using remote files – Connection handling – Database Connections.

Unit:6	Contemporary Issues	3 hours

Expert lectures, online seminars – webinars

	Total Lecture hours	**75 hours**
Text Book(s)		
1	Christopher J.Goddard, Mark White, Mastering VB Script, Galgotia Publications, New Delhi.	
2	Lee Purcell, Mary Jane Mara, The ABCs of Javascript.	
Reference Books		
1	Steven Holzner, PHP: The Complete Reference.	
2		
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Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
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Course Designed By:		

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	L	M	M	M	M	M	L
CO2	S	S	L	M	M	S	S	M	M	L
CO3	M	M	S	M	S	M	M	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	L	S	M	M	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		PYTHON Programming	L	T	P	C
Core/Elective/Supportive		Elective : I	6	0	0	4
Pre-requisite		Knowledge on logic of the programs and oops concept.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To introduce the fundamentals of Python Programming.
2. To teach about the concept of Functions in Python.
3. To impart the knowledge of Lists, Tuples, Files and Directories.
4. To learn about dictionaries in python.
5. To explores the object-oriented programming, Graphical programming aspects of python with help of built in modules..

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Remembering the concept of operators, data types, looping statements in Python programming.	**K1**
2	Understanding the concepts of Input / Output operations in file..	**K2**
3	Applying the concept of functions and exception handling	**K3**
4	Analyzing the structures of list, tuples and maintaining dictionaries	**K4**
5	Demonstrate significant experience with python program development environment	**K4-K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	BASICS OF PYTHON	10 hours

BASICS : Python – Variables – Executing Python from the Command Line – Editing Python Files – Python Reserved Words – Basic Syntax-Comments – Standard Data Types – Relational Operators – Logical Operators – Bit Wise Operators – Simple Input and Output.

Unit:2	CONTROL STATEMENTS	10 hours

CONTROL STATEMENTS: Control Flow and Syntax – Indenting – if Statement – statements and expressions- string operations- Boolean Expressions –while Loop – break and continue – for Loop. LISTS: List-list slices – list methods – list loop – mutability – aliasing – cloning lists – list parameters. TUPLES: Tuple assignment, tuple as return value –Sets – Dictionaries

Unit:3	FUNCTIONS	10 hours

FUNCTIONS: Definition – Passing parameters to a Function – Built-in functions- Variable Number of Arguments – Scope – Type conversion-Type coercion-Passing Functions to a Function – Mapping Functions in a Dictionary – Lambda – Modules – Standard Modules – sys – math – time – dir – help Function.

Unit:4	ERROR HANDLING	12 hours

ERROR HANDLING: Run Time Errors – Exception Model – Exception Hierarchy – Handling Multiple Exceptions – Data Streams – Access Modes Writing – Data to a File Reading – Data From a File – Additional File Methods – Using Pipes as Data Streams – Handling IO Exceptions – Working with Directories.

Unit:5	**OBJECT ORIENTED FEATURES**	**12 hours**
OBJECT ORIENTED FEATURES: Classes Principles of Object Orientation – Creating Classes – Instance Methods – File Organization – Special Methods – Class Variables – Inheritance – Polymorphism – Type Identification – Simple Character Matches – Special Characters – Character Classes – Quantifiers – Dot Character – Greedy Matches – Grouping – Matching at Beginning or End – Match Objects – Substituting – Splitting a String – Compiling Regular Expressions.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**55 hours**

Text Book(s)	
1	Mark Summerfield, Programming in Python 3: A Complete introduction to the Python Language , Addison-Wesley Professional, 2009.
2	Martin C. Brown, PYTHON: The Complete Reference‖, McGraw-Hill, 2001
3	E. Balagurusamy (2017), "Problem Solving and Python Programming", McGraw-Hill, First Edition.
Reference Books	
1	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2	Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011
3	Wesley J Chun, ―Core Python Applications Programming‖, Prentice Hall, 2012.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
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Course Designed By:	

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	M	L	M	S	S
CO2	S	S	S	L	S	M	L	M	S	S
CO3	S	S	S	L	S	M	L	M	S	S
CO4	S	S	S	L	S	M	L	M	S	S
CO5	S	S	S	L	S	M	L	M	S	S

*S-Strong; M-Medium; L-Low

Course code		CASE Tools Concepts and Applications	L	T	P	C
Core/Elective/Supportive		Skill based Subject – 3	6	0	0	3
Pre-requisite		Basic knowledge in software project, testing in SDLC	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To enhance the basic software engineering methods and practices.
2. To learn the techniques for developing software systems.
3. To understand the object oriented design.
4. To understand software testing approaches

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of software engineering	K1
2	Apply the software engineering models in developing software applications	K2-K3
3	Implement the object oriented design in various projects	K4
4	Knowledge on how to do a software project with in-depth analysis.	K3
5	To inculcate knowledge on Software engineering concepts in turn gives a roadmap to design a new software project.	K1-K4

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	SOFTWARE ENGINEERING	15 hours

Data Modeling: Business Growth-Organizational Model-Case Study of student MIS-What is the purpose of such Models-Understanding the business-Types of models-model development approach-the case for structural development-advantages of using a case tool. System analysis and design-what is DFD-General Rules for Drawing DFD-Difference Between Logical data flow diagram and Physical data flow diagram-Software verses Information Engineering-How case tools store information.

Unit:2	SOFTWARE DESIGN	12 hours

Approach used to solve the problem statement: How to deal with a problem statement-Data flow diagram for Payroll System-Presentation Diagram for Payroll System-sehematics of the model-Forms-Screens-Menu Screens-Data entry Screens-Report Output Format-Utilities. Installation of Ubridge and Synthesis: How to use the tools in Ubridge Synthesis for case-Installation of Ubridge Synthesis-Computer Aided Software Engineering-Getting Ubridge to work-Setup-Assign-Housekeep-The Ubridge page.

Unit:3	SOFTWARE TESTING	15 hours

Introduction to Ubridge: Introduction – Main flow of the system prototyping your Report-Introducing the Novice Model of the Operation. Introducing Synthesis – Synthesis basic – Synthesis – Menu Drawing the screen-Requirement Definition-Diagram-Data Dictionary-Document-Synthesis Main Administration – Synthesis reference – importing and exporting screen.

Unit:4	**SOFTWARE CONFIGURATION MANAGEMENT**	**15 hours**
Diagram definition tool: Introduction-Starting DDT-Drawing your own Icon – Defining the connection rules-Rebuilding your icon. Object oriented methodologies: Rambaugh et.al.‗s object modeling techniques-The Booch methodology –The Jacobson et.al. Methodologies-Pattern-Frame works-The Unified Approach.		
Unit:5	**ESTIMATION**	**15 hours**
Introduction to UML-UML Diagram-Class Diagram-Use Case Diagram-Interaction Diagram-Sequence Diagram-Collaboration Diagram-State Chart Diagram-Activity Diagram-Component Diagram-Deployment Diagram.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Case Tools Concepts and Applications, Ivan N Bayross, BPB Publications
2	Object Oriented System Development using the Unified Modeling Language, McGraw Hill International edition.
3	

Reference Books

1	Software Engineering: A Practitioner‘s Approach, Roger S Pressman, McGraw Hill International Edition.
2	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	M	M	M	M	M	L
CO2	S	S	L	S	M	S	S	S	M	L
CO3	M	M	M	M	S	M	M	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	L	S	S	M	S	S	M	M	M

*S-Strong; M-Medium; L-Low

Sixth Semester

Course code		Graphics & Multimedia	L	T	P	C
Core/Elective/Supportive		Core: 10	5	0	0	4
Pre-requisite		Basic knowledge in 2D, 3D and multimedia file formats	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. Design and apply two dimensional graphics and transformations.
2. Design and apply three dimensional graphics and transformations.
3. Apply Illumination, color models and clipping techniques to graphics.
4. Understood Different types of Multimedia File Format.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explain applications, principles, commonly used and techniques of computer graphics and algorithms for Line-Drawing, Circle- Generating and Ellipse-Generating.	**K2**
2	Students will get the concepts of 2D and 3D, Viewing, Curves and surfaces, Hidden Line/surface elimination techniques	**K3**
3	Studies concepts of Multimedia Systems, Text, Audio and Video tools	**K3**
4	Compressing audio and video using MPEG-1 and MPEG-2	**K4**
5	Creates Animation with special effects using algorithms	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	OUTPUT PRIMITIVES	15 hours

Output Primitives: Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Line function – Circle-Generating algorithms – Ellipse-generating algorithms. Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes – Character Attributes.

Unit:2	2D GEOMETRIC TRANSFORMATIONS	15 hours

2D Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Co-ordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation – 2D Viewing Functions – Clipping Operations.

Unit:3	TEXT	15 hours

Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing – Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – Device Independent Color Models – Image Processing software – File Formats – Image Output on Monitor and Printer.

Unit:4	AUDIO	15 hours

Audio: Introduction – Acoustics – Nature of Sound Waves – Fundamental Characteristics of Sound

– Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response – Audio Processing Software.		
Unit:5	**VIDEO AND ANIMATION**	**12 hours**
Video: Analog Video Camera – Transmission of Video Signals – Video Signal Formats – Television Broadcasting Standards – PC Video – Video File Formats and CODECs – Video Editing – Video Editing Software. Animation: Types of Animation – Computer Assisted Animation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio – MPEG-1 Video – MPEG-2Audio – MPEG-2 Video.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Computer Graphics, Donald Hearn, M.Pauline Baker, 2nd edition, PHI. (UNIT-I: 3.1-3.6,4.1-4.5 & UNIT-II: 5.1-5.4,6.1-6.5)
2	Principles of Multimedia, Ranjan Parekh, 2007, TMH. (UNIT III: 4.1-4.7,5.1-5.16 UNIT-IV: 7.1-7.3,7.8-7.14,7.18-7.20,7.22,7.24,7.26-28 UNIT-V: 9.5-9.10,9.13,9.15,10.10-10.13)
Reference Books	
1	Computer Graphics, Amarendra N Sinha, Arun D Udai, TMH.
2	Multimedia: Making it Work, Tay Vaughan, 7th edition, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	S	S	S	M
CO2	S	S	S	M	S	M	M	M	S	M
CO3	S	M	M	M	S	M	M	M	S	M
CO4	S	S	S	M	S	M	M	M	S	M
CO5	S	S	S	M	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code		Project Work Lab	L	T	P	C
Core/Elective/Supportive		Core: 11	0	0	5	8
Pre-requisite		Students should have the strong knowledge in any one of the programming languages in this course.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.
4. Express technical and behavioral ideas and thought in oral settings.
5. Prepare and conduct oral presentations

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Formulate a real world problem and develop its requirements develop a design solution for a set of requirements.	**K3**
2	Test and validate the conformance of the developed prototype against the original requirements of the problem.	**K5**
3	Work as a responsible member and possibly a leader of a team in developing software solutions.	**K3**
4	Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of the project.	**K1-K4**
5	Generate alternative solutions, compare them and select the optimum one.	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

AIM OF THE PROJECT WORK

6. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.
7. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.
8. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.

Viva Voce

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the **Annexure Report** available in the College, for a total of 200 marks at the last day of the practical session.
2. Out of 200 marks, 160 marks for project report and 40 marks for Viva Voce.

Project Report Format

PROJECT WORK

TITLE OF THE DISSERTATION

Bonafide Work Done by

STUDENT NAME

REG. NO.

Dissertation submitted in partial fulfillment of the requirements for the award of

<Name of the Degree>

of Bharathiar University, Coimbatore-46**.**

College Logo

Signature of the Guide Signature of the HOD

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

Month – Year

CONTENTS

2.2 Proposed System

2.2.1 Features

3. System Design and Development

3.1 File Design

3.2 Input Design

3.3 Output Design

3.4 Database Design

3.5 System Development

3.5.1 Description of Modules (Detailed explanation about the project work)

4. Testing and Implementation

5. Conclusion

Bibliography

Appendices

A. Data Flow Diagram

B. Table Structure

C. Sample Coding

D. Sample Input

E. Sample Output

Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	M	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code		Programming Lab – Graphics & Multimedia	L	T	P	C
Core/Elective/Supportive		Core Lab : 7	0	0	6	4
Pre-requisite		Students should have the basic knowledge on C and C++ to do computer graphics and multimedia applications.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To learn the basic principles of 2-dimensional computer graphics.
2. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
3. Provide an understanding of mapping from a world coordinates to device coordinates, clipping and projections.
4. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization and business applications.
9. To comprehend and analyse the fundamentals of animation, virtual reality, underlying technologies, principles and applications.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of computer graphics.	**K1**
2	Design scan conversion problems using C and C++ programming.	**K2**
3	Apply clipping and filling techniques for modifying an object.	**K3**
4	Understand the concepts of different type of geometric transformation of objects in 2D.	**K4**
5	Understand and develop the practical implementation of modeling, rendering, viewing of objects in 2D	**K6**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Programs	**36 hours**
Graphics	
1. Write a program to rotate an image.	
2. Write a program to drop each word of a sentence one by one from the top.	
3. Write a program to drop a line using DDA Algorithm.	
4. Write a program to move a car with sound effect.	
5. Write a program to bounce a ball and move it with sound effect.	
6. Write a program to test whether a given pixel is inside or outside or on a polygon.	
Multimedia	
7. Create Sun Flower using Photoshop.	
8. Animate Plane flying in the Clouds using Photoshop.	
9. Create Plastic Surgery for the Nose using Photoshop.	
10. Create See-through text using Photoshop.	
11. Create a Web Page using Photoshop.	
12. Convert Black and White Photo to Color Photo using Photoshop.	
Total Lecture hours	**36 hours**

Text Book(s)	
1	Computer Graphics, Donald Hearn, M.Pauline Baker, 2nd edition, PHI.
2	Principles of Multimedia, Ranjan Parekh, 2007, TMH.
Reference Books	
1	Computer Graphics, Amarendra N Sinha, Arun D Udai, TMH.
2	Multimedia: Making it Work, Tay Vaughan, 7th edition, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	M	M	S	M	L	L	M	L
CO2	S	S	S	M	M	M	M	M	M	L
CO3	S	S	S	M	S	M	M	M	M	L
CO4	S	S	S	S	S	M	M	M	M	M
CO5	S	S	S	S	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code		Computer Networks	L	T	P	C
Core/Elective/Supportive		Elective : II	5	0	0	4
Pre-requisite		Students should have the knowledge on computer connectivity and connectivity peripherals.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To identify various components in a data communication system and understand state-of-the-art in network protocols, architectures and applications.
2. To enable students through the concepts of computer networks, different models and their involvement in each stage of network communication.
3. To educate the concepts of terminology and concepts of the OSI reference model and the TCP/IP reference model and protocols such as TCP, UDP and IP.
4. To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
5. Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Remember the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.	**K1**
2	Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security.	**K2**
3	Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.	**K3**
4	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	**K4**
5	Knowledge about different computer networks, reference models and the functions of each layer in the models	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	BASICS OF NETWORKS AND OSI MODEL	15 hours

Network Hardware: LAN – WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI Reference Model – TCP/IP reference Model – Comparison of OSI and TCP/IP –Critique of OSI and protocols – Critique of the TCP/IP Reference model.

Unit:2	PHYSICAL LAYER	15 hours

PHYSICAL LAYER – Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber.

Unit:3	**DATA-LINK LAYER**	**15 hours**
DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols. MEDIUM-ACCESS CONTROL SUB LAYER: Multiple Access Protocols – Ethernet – Wireless LANs – Broadband Wireless – Bluetooth.		
Unit:4	**NETWORK LAYER**	**15 hours**
NETWORK LAYER: Routing algorithms – Congestion Control Algorithms. TRANSPORT LAYER: Elements of Transport Protocols – Internet Transport Protocols: TCP.		
Unit:5	**APPLICATION LAYER**	**12 hours**
APPLICATION LAYER: DNS – E-mail. NETWORK SECURITY: Cryptography – Symmetric Key Algorithms – Public Key Algorithms – Digital Signatures.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Computer Networks, Andrew S. Tanenbaum, 4th edition, PHI. *(UNIT-I:1.2-1.4 UNIT-II:2.2-2.4 UNIT-III:4.2-4.6 UNIT-IV:5.2,5.3,6.2,6.5 UNIT-V:7.1,7.2,8.1-8.4)*
Reference Books	
1	Data Communication and Networks, Achyut Godbole, 2007, TMH.
2	Computer Networks: Protocols, Standards, and Interfaces, Uyless Black, 2nd ed, PHI
3	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	M	M	S	L	M	S	M	S	M	M
CO2	S	S	L	S	M	S	M	M	S	L
CO3	M	M	S	M	S	M	M	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	M	S	M	M	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Dot Net Programming	L	T	P	C
Core/Elective/Supportive		Elective : II	5	0	0	4
Pre-requisite		Basic knowledge in web programming and VB programming	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

6. To understand .NET framework to develop web centric applications.
7. To enable students to learn the basics of I/O and object oriented programming.
8. To familiar with VB.NET and ASP.NET IDE
9. To learn about the ASP.NET controls and ADO.NET.
10. To enable the students to learn how to build and deployment of web services.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basics of .NET framework and the object oriented programming.	**K1**
2	Understand the procedures, File I/O, Error handling and Message queues.	**K2**
3	Understand and remember the components in VB.NET IDE, ADO.NET and also the window forms.	**K2**
4	Understand the HTML server controls, Web controls, Validation controls and state management and tracing.	**K3**
5	Knowledge on SOAP, building web services and deploying and publishing web services, Finding and consuming web services.	**K2-K4**

K1 – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create

Unit:1	Introduction to .NET Framework	15 hours

Introduction to .Net: .NET framework- difference between VB6 and VB .Net-Object-Oriented programming and VB .Net-Data types-Variables-Operators-Arrays-Conditional logic.

Unit:2	File I/O, Object Oriented Concepts and Message Queues	15 hours

Procedures- Dialog boxes- File IO and System objects- Error handling- Namespaces-Classes and Objects- Multithreading-Message Queue- Programming MSMQ.

Unit:3	VB.NET IDE and Controls	15 hours

VB.Net IDE-Compiling and Debugging-Customizing- Data access: ADO.Net- Visual studio .Net and ADO .Net. Windows Forms: Controls-Specific controls- Irregular forms.

Unit:4	VB.NET & ASP.NET	15 hours

VB.Net and web: Introduction to ASP .Net page framework- HTML server controls- Web controls- Validation controls- Events-CSS- State management- Tracing- Security.

Unit:5	Web Services	12 hours

UNIT V: Web Services: Introduction- Infrastructure- SOAP-Building web services- Deploying and publishing web services- Finding and consuming web services

Unit:6	Contemporary Issues	3 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Bill Evjen, Jason Beres, et.al, Visual Basic .Net programming, Wiley Dreamtech India (p) Ltd. ISBN 81-265-0254-1. (Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 25, 26, 27, 29, 31, 32, 33, 34, 35, 36, 38, 39, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50).

Reference Books

1	Fergal Grimes, Microsoft .NET for programmers, Shroff Publishers & Distributors (P) Ltd. ISBN 81-7366-540-0.
2	Thuan Thai & Hoang Q.Lam, .NET Framework Essentials, Shroff Publishers & Distributors (P) Ltd. ISBN 81-7366-654-7
3	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	M	M	M	M	M	L
CO2	M	S	L	M	M	S	S	M	L	L
CO3	M	M	S	M	S	S	S	L	S	M
CO4	M	M	S	S	S	S	M	S	M	S
CO5	S	L	S	M	M	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Distributed Computing	L	T	P	C
Core/Elective/ Supportive		Elective : II	5	0	0	4
Pre-requisite		Basic knowledge in databases, client and server	Syllabus		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To enable the students to learn the concepts and techniques in distributed computing and client server computing.
2. To learn the pros and cons of distributed computing, distributed databases.
3. To familiar with design considerations in distributed computing
4. To understand the client server models and R* projection techniques

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concepts and techniques in distributed computing and client server computing.	**K1**
2	Understand the pros and cons of distributed processing, databases, challenges.	**K2**
3	Understand the design considerations in distributed computing	**K2**
4	Understand and analyse the client server network model, file server, printer server and email server.	**K3**
5	Understand and obtaining the Knowledge on distributed databases, R* project techniques.	**K2-K4**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	Introduction to Distributed Systems	15 hours

Distributed Systems: Fully Distributed Processing systems – Networks and interconnection structures – designing a distributed processing g system.

Unit:2	Challenges and Managing Distributed Resources	15 hours

Distributed systems: Pros and Cons of distributed processing – Distributed databases – the challenges of distributed data – loading, factors – managing the distributed resources division of responsibilities.

Unit:3	Design Considerations	15 hours

Design considerations: Communication Line loading – line loading calculations- partitioning and allocation - data flow systems – dimensional analysis- network database design considerations- ration analysis- database decision trees- synchronization of network databases

Unit:4	Client Server Network Model	15 hours

Client server network model: Concept – file server – printer server and e-mail server.

Unit:5	Distributed Databases	12 hours

Distributed databases: An overview, distributed databases- principles of distributed databases – levels of transparency- distributed database design- the R* project techniques problem of heterogeneous distributed databases.

Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	John A. Sharp, An introduction to distributed and parallel processing, Blackwell Scientific Publication(Unit I & III)
2	Uyless D. Black, Data communication and distributed networks‖(unit II)
3	Joel M.Crichllow , Introduction to distributed & parallel computing (Unit IV)

Reference Books

1	Stefans Ceri, Ginseppe Pelagatti , Distributed database Principles and systems, McGraw Hill
2	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	M	M	M	M	M	L
CO2	S	S	L	S	S	S	S	S	M	L
CO3	S	M	L	M	S	M	S	L	S	M
CO4	M	M	M	S	S	S	M	S	M	M
CO5	M	L	M	M	M	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Internet of Things (IoT)	L	T	P	C
Core/Elective/Supportive		Elective: III	5	0	0	4
Pre-requisite		Students should have the basic understanding of logical circuits and hardware architecture.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To learn the concepts of IoT and its protocols.
2. To learn how to analysis the data in IoT.
3. To develop IoT infrastructure for popular applications.
4. To report about the IoT privacy, security and vulnerabilities solution

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To understand the fundamentals of Internet of Things.	K1
2	To know the basics of communication protocols and the designing principles of Web connectivity.	K2
3	To gain the knowledge of Internet connectivity principles	K2-K3
4	Designing and develop smart city in IoT	K2-K3
5	Analyzing and evaluate the data received through sensors in IOT.	K4-K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	INTRODUCTION	15 hours

Introduction - Definition & characteristics of IoT - physical design of IoT - logical design of IoT - IoT enabling Technologies - IoT levels & Deployment templates. Domain specific Iots : Home Automation - cities - Environment - Energy - retail - logistics - Agriculture - Industry i Health and life style.

Unit:2	IOT and M2M	12 hours

IoT and M2M - Deference between Iot and M2M - SDN and NFV for lot - IoT systems management - SNMP - YANG - NETOPEER

Unit:3	IOT SPECIFICATION	15 hours

IoT platforms design Methodology - purpose and specification - process specification - Domain model specification - Information model specification - Service specification - IoT level specification - functional view specification - operational view specification - Device and component Integrators - Application Development.

Unit:4	LOGICAL DESIGN USING PYTHON	15 hours

Logical design using python - Installing python - type conversions - control flow - functions - modules - File handling - classes. IoT physical devices and End points, building blocks of IoT device - Raspberry Pi - Linux on Raspberry Pi - Raspberry Pi interfaces.

Unit:5	**IOT AND CLOUD COMPUTING**	**15 hours**
IoT physical servers & cloud computing - WAMP - Xively cloud for IoT - python Web application frame work - Amazon web services for IoT.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)	
1	Internet of Things - A hands on Approach Authors: Arshdeep Bahga, Vijay Madisetti Publisher: Universities press.
Reference Books	
1	Internet of Things - Srinivasa K.G., Siddesh G.M. Hanumantha Raju R. Publisher: Cengage Learning India pvt. Ltd (2018)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	L	M	M	M	M	M	L
CO2	S	S	L	M	M	S	S	M	M	L
CO3	M	M	S	M	S	M	M	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	L	S	M	M	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Web Services	L	T	P	C
Core/Elective/ Supportive		Elective : III	5	0	0	4
Pre-requisite		Fundamentals of mark-up language, basic knowledge on distributed services.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are :

1. To familiar with distributed services, XML and web services, XML, SOAP, WSDL, UDDI specification.
2. To learn about orchestration and refinement, transactions, security issues, the common attacks.
3. To study the QOS metrics, mobile and wireless service, building real world web service applications.
4. To learn about the deployment of Web services and applications onto application servers.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand about the distributed computing, web services, technologies and applications, XML document (WSDL) and the concepts of XML, protocol (SOAP), locating the remote web services	**K1**
2	Understand the concepts of UDDI and its specifications, Understand the concepts of system interface and its workflow, the common attacks.	**K2**
3	Examining the concepts of architecture of system to meet the user requirements and analyse the concepts of mobile and wireless services, Design and develop the real-world enterprise applications using web services.	**K3**
4	Analysing the steps necessary to build and deploy the web services.	**K4**
5	Applying the applications created based on the web services on different web servers.	**K4-K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	Introduction to Web services	10 hours

UNIT I: Introduction to Web Services – Industry standards, Technologies and Concepts underlying Web Services – their support to Web Services, Applications that consume Web Services.

Unit:2	XML	10 hours

XML– its choice for web services – network protocols to back end databases technologies – SOAP, WSDL – exchange of information between applications in distributed environment – locating remote web services – its access and usage. UDDI specification – an Introduction

Unit:3	Work flow, security attacks and QoS Metrics	10 hours

A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, work flow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated within web services quality of services –

Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network bandwidth utilization, portals and services management..		
Unit:4	**Building real world enterprise applications**	**12 hours**
Building real world enterprise applications using web services – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customer s requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.		
Unit:5	**Deployment of Web services**	**12 hours**
Deployment of Web services and applications onto Tomcat application server and axis SOAP server (both are free wares) – Web services platform as a set of enabling technologies for XML based distributed computing.		
Unit:6	**Contemporary Issues**	**3 hours**
	Total Lecture hours	**55 hours**

Text Book(s)	
1	Sandeep Chatterjee, James Webber, Developing Enterprise Web Services: An Architects Guide, Prentice Hall, Nov 2003.
2	Keith Ballinger, NET Web services: Architecture and Implementation with .Net, Pearson Education, First Education Feb 2003.
3	Sandeep Chatterjee, James Webber, Developing Enterprise Web Services: An Architects Guide, Prentice Hall, Nov 2003.
Reference Books	
1	Ramesh Nagappan, Developing Java Web Services: Architecting and developing secure Web Services Using Java, John Wiley and Sons, 2003.
2	Eric A Marks and Mark J Werrell, Executive Guide to Web Services, John Wiley and Sons, 2003
3	Anne Thomas Manes, Web Services: A Managers Guide, Addison Wesley, 2003.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
Course Designed By:	

Mapping with Programme Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	M	M	S	L	M	S	M	S	M	M
CO2	S	S	L	S	M	S	M	M	S	L
CO3	M	M	S	M	S	M	M	L	S	M
CO4	M	S	M	S	S	S	M	S	M	S
CO5	S	M	S	M	M	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		Software Testing	L	T	P	C
Core/Elective/Supportive		Elective - III	5	0	0	4
Pre-requisite		Students should know about the software and Software Development Life Cycle.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To study fundamental concepts in software testing
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object-oriented software testing methods.
4. List a range of different software testing techniques and strategies and be able to apply specific automated unit testing method to the projects.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Explain the basic concepts and the processes that lead to software testing	**K2**
2	Design test cases from the given requirements using Black box testing techniques	**K3**
3	Identify the test cases from Source code by means of white box testing techniques	**K3**
4	Know about user acceptance testing and generate test cases for it	**K4**
5	Examine the test adequacy criteria to complete the testing process	**K4**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit:1	SOFTWARE DEVELOPMENT LIFE CYCLE MODELS	15 hours

Software Development Life Cycle models: Phases of Software project – Quality, Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing – Challenges in White-Box Testing.

Unit:2	BLACK-BOX TESTING	15 hours

Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? – Challenges in White Box Testing - Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase f Testing – Scenario Testing – Defect Bash.

Unit:3	SYSTEM AND ACCEPTANCE TESTING	15 hours

System and Acceptance Testing: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing - Functional testing - Non-functional Testing – Acceptance Testing – Summary of Testing Phases.

Unit:4	PERFORMANCE TESTING	15 hours

Factors governing Performance Testing – Methodology of Performance Testing – tools for Performance Testing – Process for Performance Testing – Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.

Unit:5	**TEST PLANNING, MANAGEMENT, EXECUTION AND REPORTING**	**12 hours**
Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics – Progress Metrics – Productivity Metrics – Release Metrics.		
Unit:6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Software Testing Principles and Practices, Srinivasan Desikan & Gopalswamy Ramesh, 2006, Pearson Education. *(UNIT-I: 2.1-2.5, 3.1-3.4 UNIT-II: 4.1-4.4, 5.1-5.5 UNIT III: 6 .1-6.7 (UNIT IV: 7.1-7.6, 8.1-8.5 UNIT-V: 15.1-15.6, 17.4-17.7)*
2	Limaye M.G., "Software Testing Principles, Techniques and Tools", Second Reprint, TMH Publishers, 2010.
3	Aditya P.Mathur, "Foundations of Software Testing", 2nd Edition, Pearson Education, 2013.

Reference Books

1	Effective Methods of Software Testing, William E. Perry, 3rd ed, Wiley India.
2	Software Testing, Renu Rajani, Pradeep Oak, 2007, TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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3	

Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	L	L	M	L
CO2	S	S	S	M	M	M	M	M	M	L
CO3	S	S	S	M	S	M	M	M	M	L
CO4	S	S	S	S	S	M	M	M	M	M
CO5	S	S	S	S	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

Course code		Lab – CASE TOOLS LAB	L	T	P	C
Core/Elective/Supportive		Skill Based Subject 4 (Lab) :2	0	0	4	3
Pre-requisite		Students must have the basic understanding on verification and validations in software engineering.	Syllabus Version		2021-22 Onwards	

Course Objectives:

The main objectives of this course are to:

1. To enable the students to get better understanding and knowledge in the field of CASE tools.
2. To gain practical knowledge on developing case tools
3. To develop UML diagrams for the real time problems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Prepare the CASE tools for the given specification.	**K1, K2**
2	Understand and develop the UML diagram for real time applications.	**K2-K3**
3	Design the real time test cases	**K3**
4	Analyze the development of CASE tools	**K4-K5**
5	Design the CASE tools and generate VB code	**K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Programs	**36 hours**
1. To design an ATM transfer system using UML diagram and to generate VB code.	
2. To design a student mark analysis using UML diagram and to generate VB code.	
3. To design a platform assignment system using UML diagram and to generate VB code.	
4. To design a railway reservation system using UML diagram and to generate VB code.	
5. To design an expert system for medicine field using UML diagram and to generate VB code.	
6. To design a stock maintenance system using UML diagram and to generate VB code.	
7. To design a quizzing system using UML diagram and to generate VB code.	
8. To design a remote computer monitoring system using UML diagram and to generate VB code.	
9. To design an online ticket reservation system using UML diagram and to generate VB code.	
10. To design an E-mail client server system using UML diagram and to generate VB code.	
Total Lecture hours	**36 hours**

Text Book(s)

1	

Reference Books

1	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:	

Mapping with Programme Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	S	M	S	L
CO2	L	M	S	M	M	L	S	L	S	L
CO3	S	S	L	M	M	M	S	M	S	M
CO4	S	M	S	M	S	M	S	M	S	M
CO5	M	S	S	M	M	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Annexure

BACHELOR OF COMPUTER APPLICATIONS

Syllabus

(With effect from 2021 -2022)

Program Code : 22J

DEPARTMENT OF COMPUTER APPLICATIONS
Bharathiar University
(A State University, Accredited with "A" Grade by NAAC and
13th Rank among Indian Universities by MHRD-NIRF)
Coimbatore 641 046, INDIA

BHARATHIAR UNIVERSITY : : COIMBATORE 641046

DEPARTMENT OF COMPUTER APPLICATIONS

MISSION

- ✓ To develop IT professionals with ethical and human values.
- ✓ To organize, connect, create and communicate mathematical ideas effectively, through industry 4.0.
- ✓ To provide a learning environment to enhance innovations, problem solving abilities, leadership potentials, team-spirit and moral tasks.
- ✓ To nurture the research values in the developing areas of Computer Science and interdisciplinary fields.
- ✓ Promote inter-disciplinary research among the faculty and the students to create state of art research facilities.
- ✓ To promote quality and ethics among the students.
- ✓ Motivate the students to acquire entrepreneurial skills to become global leaders.