

# B.Sc. Software System

## Syllabus

**AFFILIATED COLLEGES**

**Program Code: 26L**

**2022–2025 Batch**



# **BHARATHIAR UNIVERSITY**

(A State University, Accredited with “A” Grade by  
NAAC, Ranked 13<sup>th</sup> among Indian Universities by MHRD-  
NIRF,

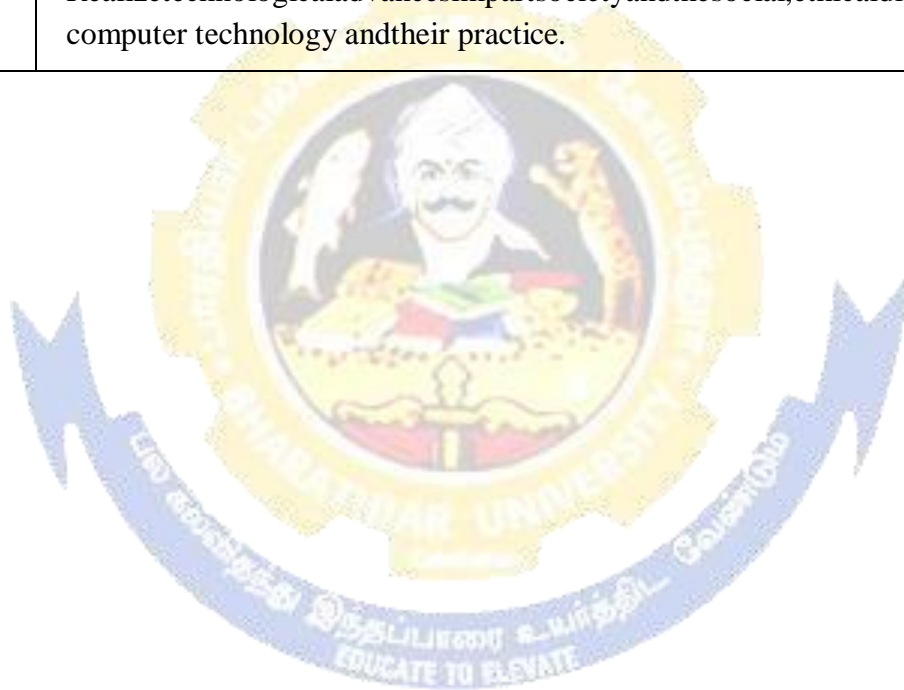
World Ranking: Times -801-1000, Shanghai-901-1000, URAP-982)

Coimbatore- 641 046 TamilNadu India

<b>Program Educational Objectives (PEOs)</b>	
The <b>B.Sc. Software System</b> program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
1	To apply software to design, principles, techniques and develop difficult and easy accessible software systems
2	To apply and acquire knowledge in various tools and techniques in software design and implementation to meet the industry requirements
3	To develop the graduates to pursuing higher education, apply new software technologies in research or entrepreneurs
4	To enrich the learner to effective communication, leadership quality and professional development
5	To stimulate the graduates to contribute nation build activity towards social responsibility, professional ethics and human values in-built in the discipline



<b>Program Specific Outcomes (PSOs)</b>	
After the successful completion of B.Sc. Software System program, the students are expected to	
1	Ability to apply fundamental principles in various software system applications
2	Acquired knowledge in software tools and implementation challenges in business varying technologies
3	Ability to apply continuous learning and implement changing technology for successful career
4	Develop to exhibit professionally or team leader or entrepreneur
5	Realize technological advances impart society and the social, ethical difficulties of computer technology and their practice.



<b>Program Outcomes (POs)</b>	
On successful completion of the B.Sc. SOFTWARE SYSTEM program	
PO1	<b>Disciplinary knowledge:</b> 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	<b>Scientific reasoning/ Problem analysis:</b> Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science.
PO3	<b>Problem solving:</b> 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	<b>Environment and sustainability:</b> Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
PO5	<b>Moderntool usage:</b> Use contemporary techniques, skills and tools necessary for integrated solutions.
PO6	<b>Ethics:</b> Function effectively with social, cultural and ethical responsibility as a individual or as a team member with positive attitude.
PO7	<b>Cooperation/Team Work:</b> Function effectively as a member or leader on multidisciplinary teams to accomplish a common objective.
PO8	<b>Communication Skills:</b> An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	<b>Self-directed and Life-long Learning:</b> Graduates will recognize the need for self-motivation to engage in life long learning to be in par with changing technology.
PO10	Enhance the research culture and uphold the scientific integrity and objectivity

**BHARATHIARUNIVERSITY::COIMBATORE641046**

**B.Sc.SoftwareSystem(CBCSPATTERN)**

(Forthestudentsadmittedfromtheacademicyear2021-2022andonwards)

**SchemeofExamination**

Part	TitleoftheCourse	Hours/ Week	Examination				Credits
			Duration inHours	MaximumMarks			
				CIA	CEE	Total	
<b>SemesterI</b>							
I	Language-I	6	3	50	50	100	4
II	English-I	6	3	50	50	100	4
III	Core1:ComputingFundamentalsandC Programming	4	3	50	50	100	4
III	Core2:DigitalFundamentalsandComputer Architecture	4	3	50	50	100	4
III	CoreLab1:ProgrammingLab-C	3	3	50	50	100	4
III	Allied1:Mathematical StructuresforComputer Science	5	3	50	50	100	4
IV	EnvironmentalStudies*	2	3	-	50	50	2
<b>Total</b>		<b>30</b>		<b>300</b>	<b>350</b>	<b>650</b>	<b>26</b>
<b>SemesterII</b>							
I	Language–II	6	3	50	50	100	4
II	English–II & Naan Muthalvan –Skill Course Effective English <a href="http://kb.naanmudhalvan.in/images/c/c7/Cambri&lt;br/&gt;dge_Course_Details.pdf">http://kb.naanmudhalvan.in/images/c/c7/Cambri dge_Course_Details.pdf</a>	4	3	25	25	50	2
III	Core3:C++Programming	2		25	25	50	2
III	CoreLab2:ProgrammingLab-C++	5	3	50	50	100	4
III	CoreLab2:ProgrammingLab-C++	4	3	50	50	100	4
III	CoreLab3:InternetBasics	2	3	25	25	50	2
III	Allied2:DiscreteMathematics	5	3	50	50	100	4
IV	ValueEducation– HumanRights*	2	3	-	50	50	2
<b>Total</b>		<b>30</b>		<b>275</b>	<b>325</b>	<b>600</b>	<b>24</b>
<b>SemesterIII</b>							
III	Core4:DataStructures	6	3	50	50	100	4
III	Core5:JavaProgramming	6	3	50	50	100	4
III	CoreLab4:Programming Lab -Java	5	3	50	50	100	4
III	Allied3:ComputerBased OptimizationTechniques	6	3	50	50	100	4
III	SkillbasedSubject1:WAP&XML	5	3	30	45	75	3
IV	Tamil**/ AdvancedTamil*(OR)Non- majorelective- I(YogaforHumanExcellence)*/ Women’s Rights*	2	3	-	50	50	2
<b>Total</b>		<b>30</b>		<b>230</b>	<b>295</b>	<b>525</b>	<b>21</b>
<b>SemesterIV</b>							
III	Core6:SystemSoftwareandOperatingSystem	6	3	50	50	100	4
III	Core7:LinuxandShellProgramming	5	3	50	50	100	4
III	CoreLab5:LinuxandShellProgramming Lab	4	3	25	25	50	2
	Naan Muthalvan – Skill Course Office Fundamentals - Lab <a href="http://kb.naanmudhalvan.in/Bharathiar&lt;br/&gt;University_(BU)">http://kb.naanmudhalvan.in/Bharathiar University_(BU)</a>	3		25	25	50	2

III	Allied4:BusinessAccounting	6	3	50	50	100	4
III	Skillbasedsubject2Lab:XML Lab	4	3	30	45	75	3
IV	Tamil**/Advanced Tamil* (OR) Non-major elective-II(GeneralAwareness*)	2	3	-	50	100	2
	<b>Total</b>	<b>30</b>		<b>230</b>	<b>295</b>	<b>525</b>	<b>21</b>

	<b>SemesterV</b>						
III	Core8: RDBMS&Oracle	6	3	50	50	100	4
III	Core9:VisualBasic	6	3	50	50	100	4
III	CoreLab6:ProgrammingLab –VB&Oracle	6	3	50	50	100	4
III	Elective – I: E-Commerce / Design andanalysisofAlgorithms/WebTechnology	6	3	50	50	100	4
III	SkillbasedSubject3:ASP.NET	6	3	30	45	75	3
	<b>Total</b>	<b>30</b>		<b>230</b>	<b>245</b>	<b>475</b>	<b>19</b>

	<b>SemesterVI</b>						
III	Core10:Graphics&Multimedia	5	3	50	50	100	4
III	Core11:ProjectWorkLab%%	5	-	60	90	150	6
III	CoreLab7:ProgrammingLab –Graphics &Multimedia	5	3	50	50	100	4
III	Elective–II:ComputerNetworks/ Software Quality Assurance / ManagementInformationSystems	5	3	50	50	100	4
III	Elective – III: Wireless MobileCommunications/ComponentT echnologies/ MasteringLAN& Troubleshooting	5	3	50	50	100	4
III	SkillBasedSubject4: ASP.NETLab	3	3	30	45	75	3
	Naan Muthalvan-Skill Course Cyber Security @ <a href="http://kb.naanmudhalvan.in/images/7/71/Cybersecurity.pdf">http://kb.naanmudhalvan.in/images/7/71/Cybersecurity.pdf</a> (or) Machine Learning # <a href="http://kb.naanmudhalvan.in/images/1/19/PBL_Google.pdf">http://kb.naanmudhalvan.in/images/1/19/PBL_Google.pdf</a> (or) Android APP Development \$ <a href="http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf">http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf</a>	2		25	25	50	2
V	ExtensionActivities**	-	-	50	-	50	2
	<b>Total</b>	<b>30</b>		<b>365</b>	<b>360</b>	<b>725</b>	<b>29</b>
	<b>GrandTotal</b>			<b>1630</b>	<b>1870</b>	<b>3500</b>	<b>140</b>

- \* NoContinuousInternalAssessment(CIA).OnlyUniversityExaminations.
- \*\*NoUniversityExaminations. OnlyContinuousInternalAssessment(CIA).

- & The English II- University semester examination will be conducted for 50 marks (As per existing pattern of Examination) and it will be converted for 25 marks.
- # Govt – Non-Autonomous Colleges, \$ Aided – Non-Autonomous Colleges, @ Self - Financing (Non – Autonomous).
- NaanMudhalvan – skill courses- external 25 marks will be assessed by Industry and internal will be offered by respective course teacher.



Coursecode	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	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To impart knowledge about Computer fundamentals</li> <li>To understand the concepts and techniques in C Programming</li> <li>To equip and indulge themselves in problem solving using C</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Learn about the Computer fundamentals and the Problem solving					<b>K2</b>
2	Understand the basic concept of C programming					<b>K2</b>
3	Describe the reason why different decision making and loop constructs are available for iteration in C					<b>K3</b>
4	Demonstrate the concept of User defined functions, Recursions, Scope and Lifetime of Variables, Structures and Unions					<b>K4</b>
5	Develop C programs using pointers Arrays and file management					<b>K3</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>Fundamentals of Computers &amp; Problem Solving in C</b>				<b>12 hours</b>	
Fundamentals of Computers: Introduction – History of Computers – Generation 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.						
<b>Unit:2</b>	<b>Overview of C</b>				<b>15 hours</b>	
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.						
<b>Unit:3</b>	<b>Decision Making, Looping and Arrays</b>				<b>15 hours</b>	
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						
<b>Unit:4</b>	<b>User-Defined Functions, Structures and Unions</b>				<b>15 hours</b>	
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 - Multifile Programs. Structures and Unions		
<b>Unit:5</b>	<b>Pointers &amp; File Management</b>	<b>15 hours</b>
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.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>3 hours</b>
Problem Solving through C Programming - Edureka		
<b>Total Lecture hours</b>		<b>75 hours</b>
<b>Text Book(s)</b>		
1	E Balagurusamy: Computing Fundamentals & C Programming - Tata McGraw-Hill, Second Reprint 2008	
<b>Reference Books</b>		
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.	
2	Henry Mullish & Hubert L. Cooper: The Sprit of C, Jaico, 1996.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
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

Coursecode	Digital Fundamentals and Computer Architecture		L	T	P	C
Core/Elective/Supportive	Core Paper :2		4	0	-	4
Pre-requisite	Student should have basic computer knowledge		Syllabus Version	2021-22 Onwards		
<b>Course Objectives:</b>						
On successful completion of this subject the student should have Knowledge on						
<ol style="list-style-type: none"> <li>1. To familiarize with different number systems and digital arithmetic &amp; logic circuits</li> <li>2. To understand the concepts of Combinational Logic and Sequential Circuits</li> <li>3. To impart the knowledge of buses, I/O devices, flip flops, Memory and bus structure.</li> <li>4. To understand the concepts of memory hierarchy and memory organization</li> <li>5. To understand the various types of microprocessor architecture</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 design concepts related to architecture organization and addressing modes					K4
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>						
<b>Unit:1</b>	<b>Number System and Arithmetic Circuits</b>				<b>12 hours</b>	
Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess 3, 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.						
<b>Unit:2</b>	<b>Combinational Logic and Sequential Circuits</b>				<b>14 hours</b>	
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.						
<b>Unit:3</b>	<b>Input-Output Organization and Data Transfer</b>				<b>12 hours</b>	
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.						
<b>Unit:4</b>	<b>Memory Organization</b>				<b>10 hours</b>	
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.		
<b>Unit:5</b>	<b>Case Studies</b>	<b>6hours</b>
CASE STUDY: Pinout diagram, Architecture, Organization and addressing modes of 80286-80386-80486-Introduction to microcontrollers.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>2hours</b>
Expert lectures, online seminars – webinars		
<b>Total Lecture hours</b>		<b>56hours</b>
<b>Text Book(s)</b>		
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	
<b>Reference Books</b>		
1	Digital Electronics Circuits and Systems, V.K.Puri, TMH.	
2	Computer Architecture, M.Carter, Schaum's outline series, TMH.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://nptel.ac.in/courses/106/103/106103068/">https://nptel.ac.in/courses/106/103/106103068/</a>	
2	<a href="http://www.nptelvideos.in/2012/12/digital-computer-organization.html">http://www.nptelvideos.in/2012/12/digital-computer-organization.html</a>	
3	<a href="http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf">http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf</a>	
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

Coursecode		ProgrammingLab-C	L	T	P	C
Core/Elective/Supportive		CoreLab:1	0	0	3	4
Pre-requisite	Students should have basic knowledge in C programming and algorithms		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>To practice the Basic concepts, Branching and Looping Statements and Strings in C programming</li> <li>To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 concept 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						
<b>Programs</b>						<b>36 hours</b>
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 student's 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 file names 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 a 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.						
<b>Total Lecture hours</b>						<b>36 hours</b>
<b>Text Book(s)</b>						
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008					
<b>Reference Books</b>						
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.					

2	HenryMullish& Hubert L.Cooper:TheSpritofC, Jaico,1996.
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>	
1	IntroductiontoProgramming inC–NPTEL
2	ProblemsolvingthroughProgramminginC– SWAYAM
3	CforEveryone: ProgrammingFundamentals–Course
CourseDesignedBy:	

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	L	M	S	S	S	L
<b>CO3</b>	S	S	S	M	L	M	S	S	S	M
<b>CO3</b>	S	S	S	L	L	M	S	S	S	L
<b>CO4</b>	S	S	S	M	L	M	S	S	S	M

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





# **Second Semester**

Coursecode	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	
<b>Course Objectives:</b>							
The main objectives of this course are to:							
<ol style="list-style-type: none"> <li>1. Impart knowledge of object-oriented programming concepts and implement them in C++</li> <li>2. Enable to differentiate procedure-oriented and object-oriented concepts.</li> <li>3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.</li> <li>4. Explain the importance of data hiding in object-oriented programming</li> </ol>							
<b>Expected Course Outcomes:</b>							
On the successful completion of the course, student will be able to:							
1	Define the different programming paradigms 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	
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>							
<b>Unit:1</b>	<b>INTRODUCTION TO C++</b>					<b>10hours</b>	
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..							
<b>Unit:2</b>	<b>CLASSES AND OBJECTS</b>					<b>10hours</b>	
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.							
<b>Unit:3</b>	<b>OPERATOR OVERLOADING</b>					<b>12hours</b>	
Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.							

<b>Unit:4</b>	<b>POINTERS</b>	<b>13hours</b>
Declaration–PointertoClass, Object–thispointer –Pointersto derivedclassesandBase classes –Arrays–Characteristics–arrayofclasses–Memorymodels–newanddeleteoperators–dynamicobject – Binding, Polymorphism and Virtual Functions.		
<b>Unit:5</b>	<b>FILES</b>	<b>13hours</b>
File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializingstringobjects– String Attributes– Miscellaneousfunctions.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>2hours</b>
Expertlectures,onlineseminars–webinars		
<b>TotalLecturehours</b>		<b>60hours</b>
<b>TextBook(s)</b>		
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education,2003.	
<b>ReferenceBooks</b>		
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.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://www.spoken-tutorial.org">https://www.spoken-tutorial.org</a>	
2	<a href="https://www.tutorialspoint.com/cplusplus/index.htm">https://www.tutorialspoint.com/cplusplus/index.htm</a>	
3	<a href="https://www.w3schools.com/cpp/">https://www.w3schools.com/cpp/</a>	
Course Designed By:		

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

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



Coursecode	PROGRAMMINGLAB-C++		L	T	P	C
Core/Elective/Supportive	CoreLab: 2		0	0	4	4
Pre-requisite	Basic understanding of computer programs and computer programming language like C.		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
<p>The main objectives of this course are to:</p> <ol style="list-style-type: none"> <li>1. Impart knowledge of object-oriented programming concepts and implement them in C++</li> <li>2. Enable to differentiate procedure-oriented and object-oriented concepts.</li> <li>3. Equip with the knowledge of concept of Inheritance so that learner understand the need of inheritance.</li> <li>4. Explain the importance of data hiding in object-oriented programming</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Define the different programming paradigms such as procedure oriented and object-oriented programming methodology and conceptualize elements of OOP 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
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Programs</b>						<b>36 hours</b>
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 strings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.						
6. Write a C++ Program to create a 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()andCalculate_Perimeter()to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGLE from class Shape and CalculateArea 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.	
<b>Text Book(s)</b>	
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003
<b>Reference Books</b>	
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.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	
2	
4	
Course Designed By:	

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

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

Coursecode	InternetBasics		L	T	P	C
Core/Elective/Supportive	CoreLab :3		0	0	2	2
Pre-requisite	Knowledgeof WINDOWSOperatingSystems		Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseareto:						
<ol style="list-style-type: none"> <li>1. Introducethe fundamentalsofInternetandtheWebfunctions.</li> <li>2. Impartknowledgeand essentialskillsnecessaryto usetheinternetanditsvariouscomponents.</li> <li>3. Find,evaluate,anduseonlineinformation resources.</li> <li>4. UseGoogleAppsforeducationeffectively.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessfulcompletion ofthecourse, studentwill beable to:						
1	Understandthe fundamentalsofInternetandthe Webconcepts					K2
2	Explaintheusageofinternet conceptsandanalyzeits components.					K2
3	Identifyandapplythe onlineinformationresources					K3
4	Inspectandutilizethe appropriateGoogle Appsforeducation effectively					K3, K4
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>						
<b>Programs</b>						<b>36hours</b>
1.Create an email account in Gmail. Using the account created compose a mail to invite other collegestudents for your college fest, enclose the invitation as attachment and send the mail to at least 50recipients.Use CCand BCCoptions accordingly.						
2.Open your inbox in the Gmail account created, check the mail received from your peer from othercollege inviting you for his college fest, and download the invitation. Reply to the mail with a thankynote fortheinviteandforwardthemailtootherfriends.						
3.Assumethatyouarestudyinginfinalyearofyourgraduationandareeagerlylookingforajob. Visitanyjob portaland upload your resume.						
4. CreateameetingusingGooglecalendarandsharemeetingidtotheattendees.Transfertheownershipertothe Manageroncthemeting idisgenerated.						
5. CreatealabelanduploadbulkcontactsusingimportoptioninGoogleContacts.						
6. CreateyourownGoogleclassroomandinviteallyourfriendsthroughemailid.PoststudymaterialinGooglecl assroomusingGoogledrive.Createaseparatefolderforeverysubjectanduploadallunit wiseE-ContentMaterials.						
7. CreateandshareafolderinGoogleDriveusing‘sharelink’optionandsetthepermissiontoaccessthat folder by yourfriendsonly.						
8. CreateonepagestoryinyourmothertonguebyusingvoicerecognitionfacilityofGoogledocs.						
9. CreatearegistrationformforyourDepartmentSeminarorConferenceusingGoogleForms.						

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 a template for a seminar certificate using Google Slides.	
15. Create a sheet to illustrate simple mathematical calculations using Google Sheets.	
16. Create a 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.	
<b>Text Book(s)</b>	
1	Ian Lamont, Google Drive & Docs in 30 Minutes, 2 <sup>nd</sup> Edition.
2	
<b>Reference Books</b>	
1	Sherry Kinkoph Gunter, My Google Apps, 2014.
2	
3	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://www.youtube.com/watch?v=NzPNk44tdlQ">https://www.youtube.com/watch?v=NzPNk44tdlQ</a>
2	<a href="https://www.youtube.com/watch?v=PKuBtQuFa-8">https://www.youtube.com/watch?v=PKuBtQuFa-8</a>
4	<a href="https://www.youtube.com/watch?v=hGER1hP58ZE">https://www.youtube.com/watch?v=hGER1hP58ZE</a>
Course Designed By:	

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

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



**Third  
Semester**

Coursecode	DataStructures		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	
<b>Course Objectives:</b>						
The main objectives of this course are to: <ol style="list-style-type: none"> <li>1. To introduce the fundamental concept of data structures</li> <li>2. To emphasize the importance of data structures in developing and implementing efficient algorithms.</li> <li>3. Understand the need for Data Structures when building application</li> <li>4. Ability to calculate and measure efficiency of code</li> <li>5. Improve programming logic skills.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>INTRODUCTION</b>				<b>15hours</b>	
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						
<b>Unit:2</b>	<b>LINKED LIST</b>				<b>12hours</b>	
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.						
<b>Unit:3</b>	<b>TREES</b>				<b>15hours</b>	
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						
<b>Unit:4</b>	<b>EXTERNAL SORTING</b>				<b>15hours</b>	
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.						

<b>Unit:5</b>	<b>INTERNAL SORTING</b>	<b>15hours</b>
InsertionSort-QuickSort-2WayMergeSort-HeapSort–ShellSort- SortingonSeveralKeys.Files:Files,QueriesandSequentialorganizations–IndexTechniques- FileOrganizations.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	EllisHorowitz,Sartaj Shani,DataStructures,GalgotiaPublication.	
2	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, Computer Algorithms, GalgotiaPublication.	
3	S.LovelynRose,R. Venkatesan,DataStructures,Wiley IndiaPrivateLimited,2015,1 <sup>st</sup> Edition	
<b>ReferenceBooks</b>		
1	Jean- Paul,Tremblay&PaulG.Sorenson,AnIntroductiontoDatastructureswithApplicationsTataMcGra w Hill Company 2008, 2ndEdition.	
2	Samanta.D,ClassicData StructurePrenticeHallof India PvtLtd 2007,9 <sup>th</sup> Edition	
3	SeymourLipschutz,DataStructuresMcGrawHill Publications,2014,1stEdition	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
2		
3		
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	M	M	S	M	M	M
<b>CO2</b>	S	S	S	M	M	M	M	M	M	M
<b>CO3</b>	S	S	S	M	S	M	M	M	S	S
<b>CO4</b>	S	S	S	M	S	S	S	S	M	M
<b>CO5</b>	S	S	S	M	M	S	S	M	M	S

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

Coursecode		JavaProgramming	L	T	P	C
Core/Elective/Supportive		Core: 5	6	0	0	4
Pre-requisite	The objective of the course is to train the student to acquire problem-solving skills through object-oriented programming		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
<p>The main objectives of this course are to:</p> <ol style="list-style-type: none"> <li>1. To expose the students with the introduction to OOPs and advantages of object-oriented programming.</li> <li>2. The concepts of OOPs make it easy to represent real world identities.</li> <li>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.</li> <li>4. Simultaneously it provides the syntax of programming language Java for solving the real-world problems.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 programs					K3
4	Develop Java programs for applets and graphics programming					K3
5	Understand the fundamental concepts of AWT controls, layouts and Events					K1-K2
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Unit:1</b>	<b>FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING</b>					<b>15hours</b>
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.						
<b>Unit:2</b>	<b>BRANCHING AND LOOPING</b>					<b>12hours</b>
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.						
<b>Unit:3</b>	<b>ARRAYS AND INTERFACES</b>					<b>15hours</b>
Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.						



<b>Unit:4</b>	<b>ERRORHANDLING</b>	<b>15hours</b>
ManagingErrorsandExceptions –AppletProgramming –GraphicsProgramming.		
<b>Unit:5</b>	<b>MANAGINGINPUT/OUTPUTFILESINJAVA</b>	<b>15hours</b>
Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Usingstreams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writingcharacters,Byte-Handling PrimitivedataTypes – RandomAccessFiles.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	ProgrammingwithJava–APrimer -E.Balagurusamy, 5 <sup>th</sup> Edition, TMH.	
2	Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10 <sup>th</sup> Edition, 2018	
3	ProgrammingwithJava–APrimer-E.Balagurusamy,3rdEdition,TMH.	
<b>ReferenceBooks</b>		
1	TheCompleteReferenceJava2-PatrickNaughton& HebertSchildt,3rdEdition,TMH	
2	ProgrammingwithJava– JohnR.Hubbard, 2ndEdition,TMH.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1	<a href="http://www.spoken-tutorial.org">www.spoken-tutorial.org</a>	
2	<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>	
3	<a href="https://www.w3schools.in/java-tutorial/">https://www.w3schools.in/java-tutorial/</a>	
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	L	S	M	M	M
<b>CO2</b>	S	S	S	M	S	L	S	M	M	M
<b>CO3</b>	S	S	S	M	S	M	S	S	M	M
<b>CO4</b>	S	S	S	M	S	M	M	S	M	M
<b>CO5</b>	S	S	S	M	S	M	S	S	M	M

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

Coursecode		<b>ProgrammingLab –JAVA</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>		<b>CoreLab:4</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>4</b>
<b>Pre-requisite</b>	Students should know about the OOPS concept and basic knowledge in java theory.		<b>Syllabus Version</b>		2021-22 Onwards	
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>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.</li> <li>4. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming</li> <li>5. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling</li> </ol>						
<b>Expected Course Outcomes:</b>						
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					<b>K1, K2</b>
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping					<b>K2</b>
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.					<b>K2, K3</b>
4	Develop applications using Strings, Interfaces and Packages and applets					<b>K3</b>
5	Construct Java programs using Multithreaded Programming and Exception Handling					<b>K3</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Programs</b>						<b>36 hours</b>
1. Write a Java Application 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.						

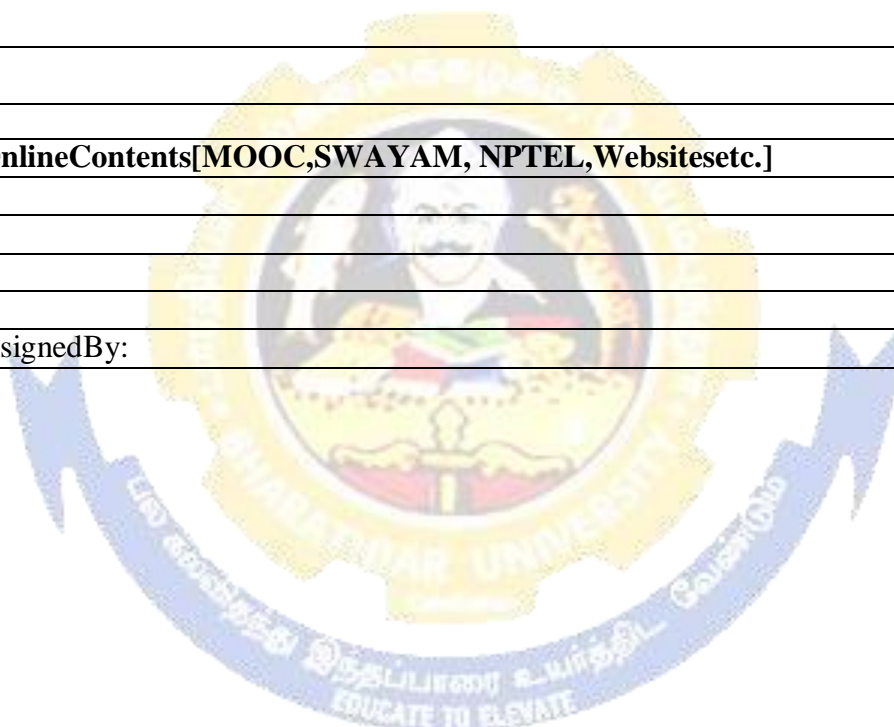
11. Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click positions.	
12. Write a Java Program which opens an existing file and appends text to that file.	
<b>Total Lecture hours</b>	
<b>36 hours</b>	
<b>Text Book(s)</b>	
1	Programming with Java – A Primer – E. Balagurusamy,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

Coursecode	WAP&XML			L	T	P	C
Core/Elective/Supportive	Skillbased Subject -1			5	0	0	3
Pre-requisite	Basicknowledgeoncomputernetworks			Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>							
Themain objectives ofthis courseareto: 1. Toenablethestudentstolearnwirelessapplicationprotocolsandarchitectures. 2. Tolearnwirelessmarkup languageandthemodeltodevelopwirelessapplicationsandwirelesstelephonicapplication s.							
<b>ExpectedCourseOutcomes:</b>							
Onthesuccessfulcompletion ofthecourse, studentwill beable to:							
1	Understand the basic concepts of WAP, wireless application protocols, componentsand WAPstandards,design principles.					K1-K2	
2	Knowledgeonbasicsofwirelessmarkuplanguagedocumentmodel,eventsand bindings.					K2-K3	
3	Understandthewireless markuplanguage, DTD, errorsandlimitation.					K3	
4	Knowledgeoncreatingwirelessapplicationsanduserinterfacedesignand itsguidelines.					K3	
5	Toinculcateknowledgeonwirelesstelephonyapplications,WTAArchitectureand mobile internet future.					K1-K4	
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>							
<b>Unit:1</b>	<b>IntroductiontoWAP</b>					<b>15hours</b>	
Market Convergence Enabling Convergence – Key Services for the Mobile Internet. Overview of theWirelessApplicationProtocol:TheOriginsofWAP–OverviewoftheWAPArchitecture– ComponentsoftheWAPStandard–NetworkInfrastructureServicesSupportingWAPClients–WAPArchitecture DesignPrinciples –RelationshiptoOtherStandards.							
<b>Unit:2</b>	<b>WirelessMarkupLanguage</b>					<b>12hours</b>	
Overview–TheWMLDocumentModel–WMLAuthoring–URLsIdentifyContent–MarkupBasics–WML– Basics– Basic Content– Events, TashsandBindings.							
<b>Unit:3</b>	<b>WirelessMarkupLanguage-SecurityandErrors</b>					<b>15hours</b>	
Controls–MiscellaneousMarkup–SendingInformation–ApplicationSecurity–OtherData:TheMetaElement– DocumentTypeDeclarations–ErrorsandBrowserLimitations–ContentGeneration–WML VersionNegotiation							
<b>Unit:4</b>	<b>MakingWirelessApplicationsand UserInterfaceDesign</b>					<b>15hours</b>	
MakingWirelessApplications,EasytoUse:WebSiteDesign:ComputerTerminalsVsMobileTerminals –DesigningaUsableWAPSite–StructuredUsabilityMethods–UserInterfaceDesignGuidelines– DesignGuidelinesfor SelectedWML Elements							
<b>Unit:5</b>	<b>WirelessTelephonyApplications</b>					<b>15hours</b>	
OverviewoftheWTAArchitecture–WTAClientFramework–WTAServer&Security–Design Considerations – Application Creation Toolbox – Future WTA Enhancements. The Mobile Internet Future:Better Content,Easier Access– BeyondBrowsing–BeyondCellular–Mobile DataUnleashed							

<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen,DavidBevis,JimChan,StefanHild,—TheWirelessApplicationProtocol,PearsonEducation, 2003.	
2		
3		
<b>ReferenceBooks</b>		
1	TCP/IPProtocolSuite,BehrouzA.Forouzan,3rdedition,TMH.	
2		
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]</b>		
1		
2		
3		
CourseDesignedBy:		





**Fourth Semester**

Coursecode	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			
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To understand the processing of programs on a computer system to design and implementation of language processor.</li> <li>2. To enhance the ability of program generation through expansion and gain knowledge about Code optimization using software tools.</li> <li>3. Students will gain knowledge of basic operating system concepts.</li> <li>4. To have an in-depth understanding of process concepts, deadlock and memory management.</li> <li>5. To provide an exposure to scheduling algorithms, devices and information management.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 concept 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
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>INTRODUCTION TO SYSTEM SOFTWARE</b>				<b>12 hours</b>	
Introduction – System Software and machine architecture. Loader and Linkers: Basic Loader Functions - Machine dependent loader features – Machine independent loader features - Loader design options						
<b>Unit:2</b>	<b>MACHINE AND COMPILER</b>				<b>15 hours</b>	
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.						
<b>Unit:3</b>	<b>OPERATING SYSTEM</b>				<b>15 hours</b>	
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.						
<b>Unit:4</b>	<b>VIRTUAL STORAGE</b>				<b>15 hours</b>	
Virtual Storage: Virtual Storage Management Strategies – Page Replacement Strategies –						

WorkingSets–DemandPaging– PageSize.ProcessorManagement:JobandProcessorScheduling:PreemptiveVs Non- preemptivescheduling–Priorities– Deadlinescheduling.		
<b>Unit:5</b>	<b>DEVICEANDINFORMATIONMANAGEMENT</b>	<b>15hours</b>
Device and Information Management Disk Performance Optimization: Operation of moving headdisk storage – Need for disk scheduling – Seek Optimization – File and Database Systems: FileSystem – Functions – Organization – Allocating and freeing space – File descriptor – Accesscontrolmatrix.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	Leland L.Beck, System Software: An Introduction to Systems Programming, Pearson, ThirdEdition.	
2	H.M.Deitel,OperatingSystems,2ndEdition,Perason,2003.	
<b>ReferenceBooks</b>		
1	Achy8utS.Godbole,OperatingSystems,TMH,2002.	
2	JohnJ. Donovan,SystemsProgramming,TMH, 1991.	
3	D.M.Dhamdhere,SystemsProgrammingandOperatingSystems,2nd RevisedEdition,TMH.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
2		
3		
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	M	M	M	S	M	M	M	M	L
<b>CO2</b>	S	S	S	S	S	M	M	M	S	L
<b>CO3</b>	S	M	M	M	S	M	S	S	S	L
<b>CO4</b>	S	S	S	M	S	S	S	M	M	M
<b>CO5</b>	S	S	S	M	S	S	S	M	M	M

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



Coursecode	LinuxandShellProgramming		L	T	P	C
Core/Elective/Supportive	Core:7		5	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			
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. Linux is a multi-user and multi-tasking operating system and after learning the concepts of an operating system</li> <li>2. Student will be able to write simple shell programming using Linux utilities, pipes and filters.</li> <li>3. The file system, process management and memory management are discussed.</li> <li>4. Various commands used by Linux shell are also discussed which make the users to interact with each other.</li> <li>5. Bourne shell programming is dealt in depth which can be used to develop applications.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 advanced Unix commands.					K3
5	Build Regular expression to perform pattern matching using utilities and implement shell scripts for real time applications.					K3-K6
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>INTRODUCTION</b>				<b>12hours</b>	
Introduction to LINUX Operating System: Introduction- The LINUX Operating System.						
<b>Unit:2</b>	<b>MANAGING FILES AND DIRECTORIES</b>				<b>15hours</b>	
Managing Files and Directories: Introduction- Directory Commands in LINUX- File Commands in LINUX.						
<b>Unit:3</b>	<b>VIEDITOR</b>				<b>15hours</b>	
Creating files using the vi editor: Text editors- The vi editor. Managing Documents: Locating files in LINUX- Standard files- Redirection - Filters- Pipes.						
<b>Unit:4</b>	<b>SECURING FILES</b>				<b>15hours</b>	
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.						
<b>Unit:5</b>	<b>CONDITIONAL EXECUTION IN SHELL SCRIPTS</b>				<b>15hours</b>	
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.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>3hours</b>
Expert lectures, online seminars -webinars		
<b>Total Lecture hours</b>		<b>75hours</b>
<b>Text Book(s)</b>		
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	
<b>Reference Books</b>		
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="http://spoken-tutorial.org/">http://spoken-tutorial.org/</a>	
2	<a href="https://www.tutorialspoint.com/linux/index.htm">https://www.tutorialspoint.com/linux/index.htm</a>	
3		
Course Designed By:		

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

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

Coursecode	Programming Lab – LINUXandSHELLPROGRAMMING		L	T	P	C
Core/Elective/Supportive	CoreLab:5		0	0	4	2
Pre-requisite	Students should have the prior basic knowledgeinoperating system.		Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseareto:						
<ol style="list-style-type: none"> <li>1. DescribethearchitectureandfeaturesofLinuxOperatingSystem</li> <li>2. TocreateprogramsinthelinuxenvironmentusingLinuxutilities andcommands.</li> <li>3. Studentisgivenan introductionofLinuxshell commands andtheywillbe abletowriteownshellscripTs.</li> <li>4. Shellprogrammingisdealtin depthwhichcanbeusedtodevelopapplications.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	DevelopLinuxutilitiestoperformFileprocessing,DirectoryhandlingandUserManagement				K1, K2	
2	Understandanddevelop shellscripTsusingpipes,redirection,filters,Pipesanddisplaysystem configuration				K2-K3	
3	Develop simple shell scripTs applicable to file access permission networkadministration				K3	
4	ApplyandchangetheownershipandfilepermissionsusingadvanceUnixcom mands.				K4-K5	
5	CreateshellscripTsforrealtimeapplications.				K6	
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>						
<b>Programs</b>					<b>36hours</b>	
1. WriteashellscripTtostimulatethefilecommands:rm,cp,cat,mv,cmp,wc,split,diff.						
2. WriteashellscripTtoshowthefollowingsystemconfiguration:						
<ol style="list-style-type: none"> <li>a. currentlyloggeduserandhislogname</li> <li>b. currentshell,homedirectory,OperatingSystemtype,currentPathsetting,currentworkingdirectory</li> <li>c. showcurrentlyloggednumberofusers,showallavailableshells</li> <li>d. showCPUinformationlikeproccsortype ,speed</li> <li>e. showmemoryinformation</li> </ol>						
3. WriteaShellScript toimplement thefollowing: pipes,Redirection andteecommands.						
4. WriteashellscripTfordisplayingcurrentdate,username,filelistinganddirectoriesbygettinguser choice.						
5. WriteashellscripT toimplement thefilter commands.						
6. WriteashellscripT to removethefiles whichhasfilesizeas zero bytes.						
7. WriteashellscripT to find thesum ofthe individual digits ofagiven number.						
8. WriteashellscripTtofindthegreatestamongthegivensetofnumbersusingcommandlinearguments.						
9. WriteashellscripTforpalindromechecking.						

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

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

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

Coursecode	XMLLab		L	T	P	C
Core/Elective/Supportive	SkillBasedSubject2(Lab):1		0	0	4	3
Pre-requisite	Basicknowledgeinmarkuplanguages.		Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseareto:						
<ol style="list-style-type: none"> <li>1. Toenablethestudentstolearnwirelessapplicationprotocolsandarchitectures.</li> <li>2. Tolearnwirelessmarkuplanguageandthemodeltodevelopwirelessapplicationsandwirelesstel ephonicapplications.</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understandthebasicconcepts of WAP, wireless application protocols, componentsand WAPstandards,design principles.					K1-K2
2	Knowledgeonbasicsofwirelessmarkuplanguagedocumentmodel,eventsand bindings.					K2-K3
3	Understandthewireless markuplanguage, DTD, errorsandlimitation.					K3
4	Knowledgeoncreatingwirelessapplicationsanduserinterfacedesignand itsguidelines.					K3,K6
5	Toinculcateknowledgeonwirelesstelephonyapplications, WTAarchitectureand mobile internet future.					K2-K4K6
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>						
<b>Programs</b>					<b>36hours</b>	
1.Create ademo forXSLT.						
2.Create amenuin XML.						
3.Writean XML documentto display yourbio-data						
4.Display XMLinformationin Treestructure format.						
5.WriteaXML programto navigatetherecordsin thefile.						
6.Writeaprogram to savedata to anXMLfile.						
7.Writeaprogram toshow thefunction ofCDATA.						
8.WriteaXMLprogramtomaintainthestudent database.						
9.Writeaprogramto generateXMLfilefromthe Database.						
10.WriteaXMLprogramto implementtheInternalDTDand ExternalDTD.						
11.Writeaprogram to loadatext fileinto adiv element with XML HTTP.						
12.Listdata fromanXML filewith XMLHTTP.						
<b>TotalLecturehours</b>					<b>36hours</b>	
<b>TextBook(s)</b>						
1	DavidHunteretal.,Beginning XML,WroxPublications2000.					
<b>ReferenceBooks</b>						
1	HTMLandXMLanIntroduction,NIIT,PrenticeHalof IndiaPvt.Ltd					
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>						

1	
2	
CourseDesignedBy:	

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

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



Coursecode		Office Fundamentals	L	T	P	C
Core/Elective/Supportive		Naan Mudhalvan Skill Based Course	0	0	3	2
<a href="http://kb.naanmudhalvan.in/Bharathiar_University_(BU)">http://kb.naanmudhalvan.in/Bharathiar_University_(BU)</a> <b>Refer the Content of the Serial. No. 2</b>						





# **Fifth Semester**



Coursecode	RDBMS&Oracle		L	T	P	C
Core/Elective/Supportive	Core:8		6	0	0	4
Pre-requisite	Basicknowledgeaboutthedata,tableanddatabasein computers	Syllabus Version	2021-22 Onwards			
<b>CourseObjectives:</b>						
Themain objectives ofthis course areto: 1. Thecoursedescribesthedata,organizingthedataindatabase,database administration. 2. Tograsp thedifferent issues involvedin thedesign of adatabasesystem. 3. Tostudythephysicaland logicaldatabasesigns anddatabasemodelinglikere relational,Hierarchical, networkmodels,databasesecurity, integrity and normalization. 4.ItalsogivesintroductiontoSQLlanguageto retrievethedata fromthedatabasewith suitableapplicationdevelopment. 5. Provide strong foundation of database concepts and to introduce students to applicationdevelopmentin DBMS.						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completion ofthecourse,student willbe ableto:						
1	Understand the basic concepts of Relational Data Model, Entity-RelationshipModel andprocess of Normalization				K1-K2	
2	Understandand construct databaseusingStructuredQueryLanguage(SQL)in Oracle9i environment.				K1-K3	
3	Learn basics of PL/SQL and develop programs using Cursors,Exceptions,Procedures and Functions.				K1-K4	
4	Understandandusebuilt-infunctionsandenhancetheknowledgeofhandlingmultiple tables				K1-K3	
5	AttainagoodpracticalskillofmanagingandretrievingofdatausingData Manipulation Language(DML)				K2-K4	
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 –Create</b>						
<b>Unit:1</b>	<b>DATABASE CONCEPTS</b>				<b>15hours</b>	
Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational DataModel – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling andNormalization: Data Modeling – Dependency – Database Design – Normal forms – DependencyDiagrams– De-normalization – Another ExampleofNormalization.						
<b>Unit:2</b>	<b>ORACLE9i</b>				<b>15hours</b>	
Oracle9i: 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 - iSQL *Plus. Oracle Tables: DDL: NamingRules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying TableInformation–AlteringanExistingTable–Dropping,Renaming,TruncatingTable–TableTypes –Spooling – Errorcodes.						
<b>Unit:3</b>	<b>WORKINGWITHTABLE</b>				<b>15hours</b>	
Working with Table: Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data fromTable–ArithmeticOperations–restrictingDatawithWHEREclause–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.		
<b>Unit:4</b>	<b>PL/SQL</b>	<b>15hours</b>
PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.		
<b>Unit:5</b>	<b>PL/SQL COMPOSITE DATA TYPES</b>	<b>12hours</b>
PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>3hours</b>
Expert lectures, online seminars - webinars		
	<b>Total Lecture hours</b>	<b>75hours</b>
<b>Text Book(s)</b>		
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., 6 <sup>th</sup> Edition, February 2014.	
<b>Reference Books</b>		
1	Database Management Systems, Majumdar & Bhattacharya, 2007, TMH.	
2	Database Management Systems, Gerald V. Post, 3rd edition, TMH.	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="http://www.digimat.in/nptel/courses/video/106105175/L01.html">http://www.digimat.in/nptel/courses/video/106105175/L01.html</a>	
2	<a href="https://www.tutorialspoint.com/oracle_sql/index.htm">https://www.tutorialspoint.com/oracle_sql/index.htm</a>	
3		
Course Designed By:		

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

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

Coursecode	VisualBasic			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		
<b>Course Objectives:</b>								
The main objectives of this course are to:								
<ol style="list-style-type: none"> <li>1. The main aim of the course is to cover visual basic programming skills required for modern software development.</li> <li>2. To study the advantages of Controls available with visual basic.</li> <li>3. To gain a basic understanding of database access and management using data controls.</li> <li>4. To facilitate the learner to carry out project works using the tools available in VB and MS Access.</li> </ol>								
<b>Expected Course Outcomes:</b>								
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, menu 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	
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>								
<b>Unit:1</b>	<b>INTRODUCTION TO VB</b>					<b>15hours</b>		
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.								
<b>Unit:2</b>	<b>MENUS IN VB</b>					<b>15hours</b>		
Menus, Mouse events and Dialog boxes: Mouse events, Dialog boxes, MDI and Flexgrid: MDI, Using the Flexgrid control.								
<b>Unit:3</b>	<b>ODBC AND DATA ACCESS OBJECTS</b>					<b>15hours</b>		
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.								
<b>Unit:4</b>	<b>OBJECT LINKING AND EMBEDDING</b>					<b>15hours</b>		
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.								
<b>Unit:5</b>	<b>CONTROLS IN VB</b>					<b>12hours</b>		
Additional controls in VB: sstabs control, setting properties at runtime, adding control to tab, list control, tabstrip control, MS Flexgrid control, Why ADO, Establishing reference, Crystal and								

Data reports.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>3hours</b>
Expert lectures, online seminars - webinars		
	<b>Total Lecture hours</b>	<b>75hours</b>
<b>Text Book(s)</b>		
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. <b>(Unit I to Unit IV)</b>	
2	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006. <b>(Unit V)</b>	
3		
<b>Reference Books</b>		
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.	
3		
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
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Course Designed By:		

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

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

Coursecode		Programming Lab – VB& Oracle	L	T	P	C
Core/Elective/Supportive		CoreLab :6	0	0	6	4
Pre-requisite	Students should have the theoretical knowledge in visual basic and oops concept.	Syllabus Version	2021-22 Onwards			
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To develop applications using Graphical User Interface tools.</li> <li>2. To understand the design concepts.</li> <li>3. To design and build database systems and demonstrate their competence.</li> <li>4. To create requirement analysis and specification for software applications.</li> </ol>						
<b>Expected Course Outcomes:</b>						
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
<b>K1</b> –Remember; <b>K2</b> –Understand; <b>K3</b> –Apply; <b>K4</b> – Analyze; <b>K5</b> – Evaluate; <b>K6</b> –Create						
<b>Programs</b>						<b>36 hours</b>
1. Construction of an Arithmetic Calculator (Simple).						
2. Writing simple programs using loops and decision-making statements.						
<ol style="list-style-type: none"> <li>a. Generate Fibonacci series.</li> <li>b. Find the sum of N numbers.</li> </ol>						
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 RichText box control.						
5. Write a program to illustrate CommonDialog 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						
<ol style="list-style-type: none"> <li>a. Binary</li> <li>b. Octal</li> <li>c. Hexa-decimal</li> </ol>						
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 an Oracle database connectivity program.	
	<b>Total Lecture hours</b>
	<b>36 hours</b>
<b>Text Book(s)</b>	
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8 <sup>th</sup> reprint, 2007. <b>(Unit I to Unit IV)</b>
2	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006. <b>(Unit V)</b>
3	E-Book: Bill Pribyl, Steven Feuerstein, "Oracle PL/SQL Programming", O'Reilly Media, Inc., 6 <sup>th</sup> Edition, February 2014.
<b>Reference Books</b>	
1	Gray Cornell (2003), "Visual Basic 6 from ground up" TMH, New Delhi, 1 <sup>st</sup> Edition,
2	Deitel and Deitel, T.R. Nieto (1998), "Visual Basic 6 – How to Program", Pearson Education. First Edition.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
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Course Designed By:	

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

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

Coursecode	ECommerce		L	T	P	C
Core/Elective/Supportive	Elective-I		6	0	0	4
Pre-requisite	Basic understanding in use of internet in commercial applications	Syllabus Version	2021-22 Onwards			
<b>Course Objectives:</b>						
The main objectives of this course are to: <ol style="list-style-type: none"> <li>To enable the student to learn and understand the E-Commerce strategies.</li> <li>To understand the E-Market and EDI standards and implementations.</li> <li>To study and understand the online payments in E-Commerce applications and other E-Commerce applications used in the internet.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understanding the basics of E-Commerce and its strategies.					<b>K1, K2</b>
2	Knowledge in basics of business strategy, E-Commerce implementation, the credit transaction trade cycle.					<b>K2</b>
3	Understand the E-markets, EDI standards, communication and implementations.					<b>K3</b>
4	Understand the internet, HTML, server side scripting and client side scripting languages, online payments in E-Commerce applications.					<b>K4</b>
5	Knowledge in the internet bookshops, electronic newspapers, virtual auctions gambling on the Net and e-diversity.					<b>K4</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>Introduction to E-Commerce</b>				<b>10 hours</b>	
The Scope of E-Commerce – Definition-E-Commerce & the Trade Cycle – Electronic Market – Electronic Data Interchange – The Internet Commerce – The E-Commerce in Perspective. Business Strategy: The Value Chain–Supply Chains–Porter’s Value Chain Model–The Inter Organizational Value Chain						
<b>Unit:2</b>	<b>The Introduction to Business Strategy</b>				<b>10 hours</b>	
The Introduction to Business Strategy – Strategic Implications of IT – Technology – Business Environment–Business Capability–Existing Business Strategy–Strategy Formulation & Implementation Planning–e-Commerce Implementation–Commerce Evaluation. The Inter Organizational Transactions–The Credit Transaction Trade Cycle. A Variety of Transactions–Pens & Things.						
<b>Unit:3</b>	<b>E-Markets</b>				<b>10 hours</b>	
Markets–E-Markets-Usage of E-Markets-Advantages & Disadvantages of E-Markets. EDI: Introduction–Definition-Benefit of EDI–EDI Standards–EDI Communication EDI Implementation– EDI Agreement– EDI Security						
<b>Unit:4</b>	<b>The Internet</b>				<b>12 hours</b>	
The Internet–The Development of the Internet–TCP/IP–Internet Components–Uses of the Internet–A Page on the Web: HTML Basics–Introduction to HTML–Further HTML–Client						

SideScripting–ServerSideScripting– HTMLEditors&Editing–TheElementsofE-Commerce :Elements–e-Visibility–Thee-Shop–OnlinePayments-DeliveringtheGoods–Internete- CommerceSecurity .		
<b>Unit:5</b>	<b>E-Business:Introduction</b>	<b>12hours</b>
-TheInternetBookshops–GrocerySupplies-SoftwareSuppliesandSupport–ElectronicNewspapers – The Internet Banking - The Virtual Auctions – Online Share Dealing – Gambling ontheNet – e- Diversity.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
<b>TotalLecturehours</b>		<b>55hours</b>
<b>TextBook(s)</b>		
1	DavidWhiteley,E-Commerce–Strategy,Technology&Applications,TataMcGrawHill.	
2		
<b>ReferenceBook(s)</b>		
1	E-Commerce-An IndianPerspective,P.T.Joseph, S.J.,FourthEdition,PHI2012.	
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]</b>		
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CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	L	M	L	S	M	M	L
<b>CO3</b>	S	S	S	L	M	M	S	M	S	L
<b>CO3</b>	S	S	S	M	S	M	S	S	S	M
<b>CO4</b>	S	S	S	M	S	M	S	S	M	M
<b>CO5</b>	S	M	M	M	M	S	S	S	S	M

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



Coursecode	Design and Analysis of Algorithms	L	T	P	C
Core/Elective/Supportive	Elective-I	6	0	0	4
Pre-requisite	Basic knowledge in computer algorithms	Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>					
The main objectives of this course are to:					
<ol style="list-style-type: none"> <li>To enable the students to learn divide and conquer, dynamic programming and backtracking methods and apply for real time applications.</li> <li>To learn about how effectively an algorithm should be developed by considering time and space complexities.</li> </ol>					
<b>Expected Course Outcomes:</b>					
On the successful completion of the course, student will be able to:					
1	Remembering the basics of algorithm and performance analysis of algorithms.				<b>K1</b>
2	Knowledge in divide and conquer methods searching, sorting and greedy method and general method.				<b>K2</b>
3	Understand the dynamic programming techniques and apply.				<b>K3-K6</b>
4	Knowledge in backtracking problems and apply these problems into many real time applications.				<b>K4-K6</b>
5	Understand and apply the concepts of NP-hard and NP-complex problem, travelling salesmen problem and parallel assignment instruction.				<b>K4-K6</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>					
<b>Unit:1</b>	<b>Introduction</b>				<b>10hours</b>
What is an Algorithm? – Algorithm Specification – Performance Analysis (Space Complexity, Time Complexity) – Randomized Algorithms. Analysis of Algorithms: Computational Complexity – Average-Case Analysis – Example: Analysis of Quick Sort.					
<b>Unit:2</b>	<b>Divide and Conquer</b>				<b>10hours</b>
General Method – Binary Search – Merge Sort – Quick Sort. Greedy Method: General Method – Knapsack Problem – Minimum Cost Spanning Tree – Single Source Shortest Path.					
<b>Unit:3</b>	<b>Dynamic Programming</b>				<b>10hours</b>
General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsack – Traveling Salesman Problem – Flow Shop Scheduling.					
<b>Unit:4</b>	<b>Backtracking</b>				<b>12hours</b>
General Method – 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem. Branch and Bound: The Method – 0/1 Knapsack Problem – Traveling Salesperson.					
<b>Unit:5</b>	<b>Algebraic Problems</b>				<b>12hours</b>
General Method – Evaluation and Interpolation – Modular Arithmetic – Even Faster Evaluation and Interpolation. NP-Hard and NP-Complex Problem: Basic Concepts – Traveling Salesperson Decision Problem – Scheduling Identical Processors – Implementing Parallel Assignment					

Instructions.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>55hours</b>
<b>TextBook(s)</b>		
1	EllisHorowitz,SartajSahni,SanguthevarRajasekaran,“FundamentalsofComputerAlgorithms”,Second Edition,Universities Press,2008	
2	Robert Sedgewick, Phillipe Flajolet, “An Introduction to the Analysis of Algorithms”, Addison-WesleyPublishing Company, 1996.	
<b>ReferenceBook(s)</b>		
1	AlfredV.Aho,JohnE. Hocroft,JeffreyD.Ullman,“DataStructuresandAlgorithms”	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
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CourseDesignedBy:		

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

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

Coursecode	WebTechnology		L	T	P	C
Core/Elective/Supportive	Elective: I		6	0	0	4
Pre-requisite	Basicknowledgeinwebserver,browserandwebappli cation		Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseareto: 1. Oncompletionofthiscourse,astudentwillbefamiliarwithclientserver architectureandableto develop aweb applicationusing javatechnologies. 1. Studentswill gainthe skills andproject-basedexperienceneeded forentry into webapplicationand development careers 3. Understandbesttechnologiesforsolvingwebclient/serverproblems 4. UseJavascriptfordynamiceffects andto validateforminput entry 5. AnalyzetoUseappropriateclient-sideor Server-sideapplications						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completion ofthecourse,student willbe ableto:						
1	UnderstandandanalysetheTCP/IPbasics.					K1
2	UnderstandDomainservername,FTP,TFTP,basicsofWWW,webbrowser architecture.					K2
3	KnowledgeofMicrosoftandjavatechnologies,dynamicwebpages,DHTML,ASP andJSP.					K2-K3
4	Understandingactivewebpages,JavaApplet,Javabean,CORBA,RMIandEDI architecture					K2-K3
5	KnowledgeonXML,XML parser, WAP					K4-K6
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 –Create</b>						
<b>Unit:1</b>	<b>TCP/IP</b>				<b>15hours</b>	
TCP/IP: TCP/IP Basics – Why IP address – Logical Address - TCP/IP Example- The concept of IPaddress–BasicofTCP–FeaturesofTCP–RelationshipbetweenTCPandIP–PortsandSockets – Active Open and Passive Open - TCP Connections – What makes TCP reliable? – TCPPacketformat -Persistent TCPconnections– UDP – DifferencesbetweenTCP and UDP.						
<b>Unit:2</b>	<b>DNS</b>				<b>12hours</b>	
DNS–E-mail–FTP–TFTP–HistoryofWWW–BasicsofWWWandBrowsing-Local informationontheinternet–HTML–WebBrowserArchitecture–WebPagesandMultimedia– RemoteLogin (TELNET).						
<b>Unit:3</b>	<b>INTRODUCTIONTOWEBTECHNOLOGY</b>				<b>15hours</b>	
IntroductiontoWebTechnology: Webpages–Tiers–Conceptofa Tier–ComparisonofMicrosoft and Java Technologies – Web Pages – Static Web Pages – Plug-ins – Frames – Forms.Dynamic Web Pages: Need – Magic of Dynamic Web Pages – Overview of Dynamic Web PageTechnologies – Overview of DHTML – Common Gateway Interface – ASP – ASP Technology –ASP Example– Modern Trends inASP–JavaandJVM –JavaServlets –JavaServer Pages.						

<b>Unit:4</b>	<b>ACTIVEWEBPAGES</b>	<b>15hours</b>
Active Web Pages: Active Web Pages in better solution – Java Applets – Why are Active WebPages Powerful? – Lifecycle of Java Applets – ActiveX Controls – Java Beans. Middleware andComponent-BasedE-CommerceArchitectures:CORBA–JavaRemoteMethodInvocation–DCOM. EDI: Overview – Origins of EDI – Understanding of EDI – Data Exchange Standards – EDIArchitecture– Significanceof EDI– Financial EDI– EDIand internet.		
<b>Unit:5</b>	<b>XML</b>	<b>15hours</b>
XML:SGML–BasicsofXML–XMLParsers–Needforastandard.WAP:LimitationsofMobile devices – Emergence of WAP – WAP Architecture – WAP Stack – Concerns about WAPandits future– Alternatives to WAP.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
<b>TotalLecturehours</b>		<b>75hours</b>
<b>TextBook(s)</b>		
1	Web Technologies: TCP/IP to Internet Applications Architectures – Achyut S Godbole & AtulKahate,2007,TMH.(UNIT-I: 3.1-3.5,4.1-4.12 UNIT-II: 5.1-5.4,6.1-6.7 UNITIII:8.1-8.1,9.1-9.13 UNITIV: 10.1-10.7,15.1-15.3,16.1-16.8UNIT-V: 17.1-17.4,18.1-18.6)	
<b>ReferenceBooks</b>		
1	InternetandWebTechnologies,Rajkamal,TMH.	
2	TCP/IPProtocolSuite,BehrouzA.Forouzan,3rdedition,TMH.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
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CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	L	S	L	L	L	S	S
<b>CO2</b>	S	S	S	M	S	M	L	L	S	S
<b>CO3</b>	S	S	S	L	S	M	M	M	S	S
<b>CO4</b>	S	S	S	M	S	L	M	L	S	S
<b>CO5</b>	S	S	S	L	S	L	M	L	S	S

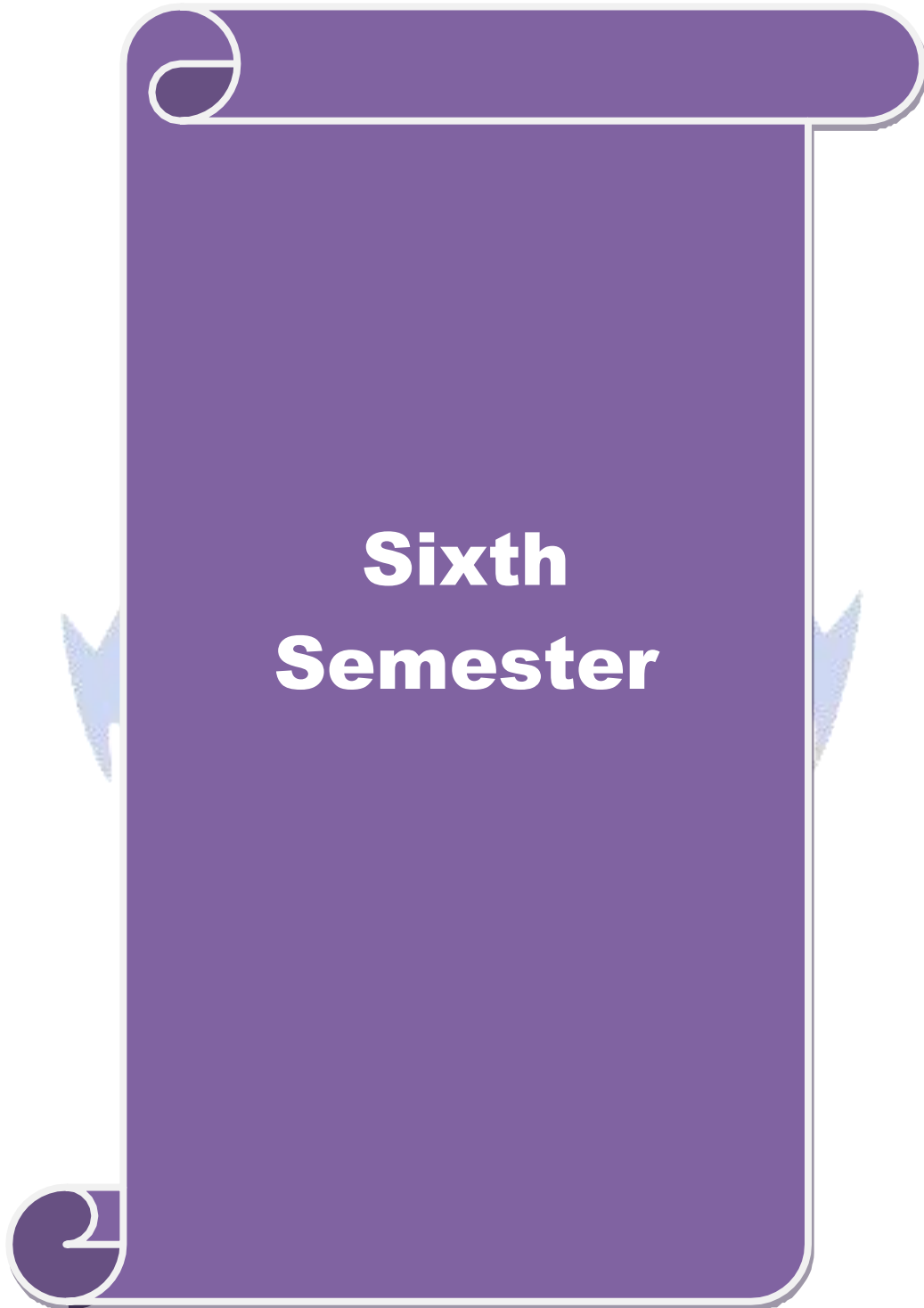
\*S-Strong;M-Medium;L-Low

Coursecode	ASP.NET			L	T	P	C	
Core/Elective/Supportive	SkilledBasedSubject - 3			6	0	0	3	
Pre-requisite	Basicknowledgeinwebserver,browserandprogramming			Syllabus Version	2021-22 Onwards			
<b>CourseObjectives:</b>								
Themain objectives ofthis courseareto:								
<ol style="list-style-type: none"> <li>1. ToenablethestudentstolearnaboutASP.NETtodevelopwebformswithdatabaseconnectivity,how to do session tracking and management.</li> <li>2. TolearnaboutwebservicesandtheroleofWSDLandSOAPindevelopingwebservices.</li> </ol>								
<b>ExpectedCourseOutcomes:</b>								
Onthesuccessful completion ofthecourse,student willbe ableto:								
1	Understandingthe basics of .Net, development environment. Overview of ASP.NETandprogramflow.						K1-K2	
2	KnowledgeonASP.NETandVB.NETandbuilt inobjects.						K2	
3	Understandwebforms,ASP.NETconfiguration,stateandsessionmanagements.						K3	
4	Understandingscripting object models,activeservercomponentsandcontrols.						K4	
5	Knowledgeonwebservices,developingwebapplications,datacentricwebapplicationsusing ADO.NET.						K4-K6	
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>								
<b>Unit:1</b>	<b>BASICSO .NET</b>					<b>10hours</b>		
Getting Setup - what is ASP.NET- Setting up for ASP.NET- The development environment – ASP& ASP.NET. An overview – ASP.NET Programming Languages. Programming Basics: Basics ofProgramming–ProgramFlow–EffectiveCodingTechniques–DesigningApplications.								
<b>Unit:2</b>	<b>ASP.NET with VB</b>					<b>10hours</b>		
How DynamicWebsiteApplicationswork-ProcessingASP.NET withVisualbasic. NET:VB.NETProgrammingLanguageStructures– BuiltinASP.NETObjects&InteractivityTheresponseobject –TheASP Serverobject.								
<b>Unit:3</b>	<b>Webforms&amp;ASP.NET</b>					<b>10hours</b>		
Webforms-ASP.NETConfiguration,ScopeandState:ASP.NETandconfigurationASP.NETandstate– Theapplication object–ASPsessions – Thesession object.								
<b>Unit:4</b>	<b>ASP.NETObjectsandcomponents</b>					<b>12hours</b>		
TheScriptingObjectModel-ActiveServerComponentsandControls–MoreActiveServerComponents.								
<b>Unit:5</b>	<b>Webservices&amp;ASP.NETwithADO.NET</b>					<b>12hours</b>		
Web services & ASP. NET –WSDL & SOAP- Web services Background – ASP.NET &SQLserver- using SQL server –using databases in ASP.NET applications- ActiveX data objects theADO.NETObjectivemodel–coding structured query language.								

<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
<b>TotalLecturehours</b>		<b>55hours</b>
<b>TextBook(s)</b>		
1	DaveMercer,—ASP.NETABeginner’sGuidel, TataMcGraw–HillPub.CompanyLtd,2002	
2	MattJ.Couch,—ASP.NETandVB.NETWebprogramming—,Pearson Education,2002	
<b>ReferenceBook(s)</b>		
1	Kirk Allen Evans, AshwinKamanna, Joel Mueller, —XML and ASP.NET , PearsonEducation,2002.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
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CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	L	S	L	L	L	S	S
<b>CO2</b>	S	S	S	M	S	M	L	L	S	S
<b>CO3</b>	S	S	S	L	S	M	M	M	S	S
<b>CO4</b>	S	M	M	M	S	M	M	L	S	S
<b>CO5</b>	S	S	S	L	S	M	M	L	S	S

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



Coursecode	Graphics&Multimedia			L	T	P	C	
Core/Elective/Supportive	Core:10			5	0	0	4	
Pre-requisite	Basicknowledgein2D,3Dandmultimediafileformats			Syllabus Version		2021-22 Onwards		
<b>CourseObjectives:</b>								
Themain objectives ofthis courseareto: 1. Designandapplytwo dimensionalgraphicsandtransformations. 2. Designandapplythreedimensionalgraphicsandtransformations. 3. ApplyIllumination,colormodelsandclippingtechniquestographics. 4. UnderstoodDifferenttypesofMultimediaFileFormat.								
<b>ExpectedCourseOutcomes:</b>								
Onthesuccessful completion ofthecourse,student willbe ableto:								
1	Explainapplications,principles,commonlyusedandtechniquesofcomputergraphicsandalgorithmsforLine-Drawing,Circle-GeneratingandEllipse-Generating.						K2	
2	Studentswillgettheconceptsof2Dand3D,Viewing,Curvesandsurfaces,Hidden Line/surfaceeliminationtechniques						K3	
3	Studiesconceptsof MultimediaSystems,Text, Audioand Videotools						K3	
4	CompressingaudioandvideousingMPEG-1andMPEG-2						K4	
5	CreatesAnimationwithspecialeffectsusinalgorithms						K6	
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>								
<b>Unit:1</b>	<b>OUTPUTPRIMITIVES</b>					<b>15hours</b>		
Output Primitives: Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Linefunction–Circle-Generatingalgorithms–Ellipse-generatingalgorithms.AttributesofOutputPrimitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes –CharacterAttributes.								
<b>Unit:2</b>	<b>2DGEOMETRICTRANSFORMATIONS</b>					<b>15hours</b>		
2D Geometric Transformations: Basic Transformations – Matrix Representations – CompositeTransformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Co-ordinateReferenceFrame–Window-to-ViewportCo-ordinateTransformation-2DViewingFunctions– Clipping Operations.								
<b>Unit:3</b>	<b>TEXT</b>					<b>15hours</b>		
Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – Fileformats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing –Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – DeviceIndependentColorModels–ImageProcessingsoftware–FileFormats–ImageOutputonMonitorand Printer.								
<b>Unit:4</b>	<b>AUDIO</b>					<b>15hours</b>		
Audio:Introduction–Acoustics–NatureofSoundWaves–FundamentalCharacteristics ofSound –Microphone–Amplifier–Loudspeaker–AudioMixer–DigitalAudio–Synthesizers–MIDI–								

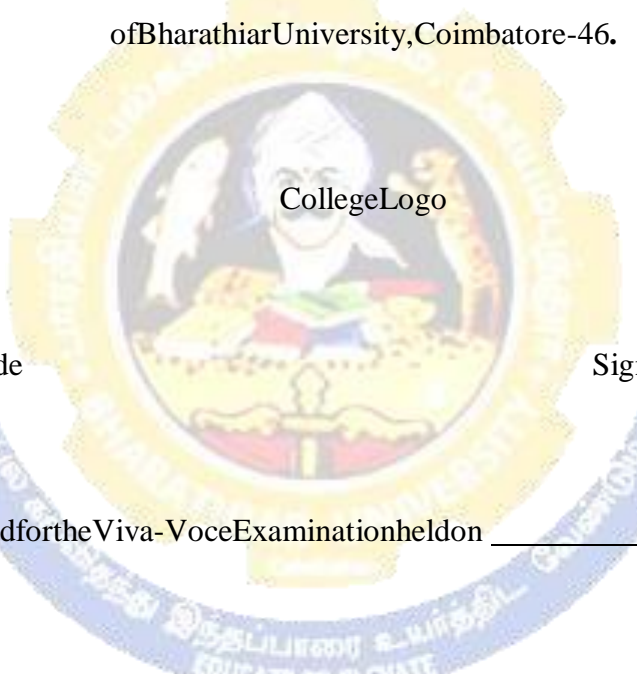


Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response - AudioProcessingSoftware.		
<b>Unit:5</b>	<b>VIDEOANDANIMATION</b>	<b>12hours</b>
Video:AnalogVideoCamera–TransmissionofVideoSignals–VideoSignalFormats–Television Broadcasting Standards– PC Video – Video File Formats and CODECs – VideoEditing– VideoEditingSoftware.Animation:TypesofAnimation–ComputerAssistedAnimation – Creating Movement – Principles of Animation – Some Techniques of Animation –Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio –MPEG-1Video -MPEG-2Audio – MPEG-2 Video.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
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:7.1-7.3,7.8-7.14,7.18-7.20,7.22,7.24,7.26-28UNIT-V: 9.5-9.10,9.13,9.15,10.10-10.13)	
<b>ReferenceBooks</b>		
1	ComputerGraphics,AmarendraNSinha,ArunD Udai,TMH.	
2	Multimedia:MakingitWork,Tay Vaughan,7thedition,TMH.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
2		
3		
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	M	S	S	S	M
<b>CO2</b>	S	S	S	M	S	M	M	M	S	M
<b>CO3</b>	S	M	M	M	S	M	M	M	S	M
<b>CO4</b>	S	S	S	M	S	M	M	M	S	M
<b>CO5</b>	S	S	S	M	S	M	S	S	S	M

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

Coursecode		ProjectWorkLab	L	T	P	C
Core/Elective/Supportive		Core:11	0	0	5	6
Pre-requisite	Students should have the strong knowledge in any one of the programming languages in this course.		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
The main objectives of this course are to: <ol style="list-style-type: none"> <li>1. To understand and select the task based on their core skills.</li> <li>2. To get the knowledge about analytical skill for solving the selected task.</li> <li>3. To get confidence for implementing the task and solving the real time problems.</li> <li>4. Express technical and behavioral ideas and thought in oral settings.</li> <li>5. Prepare and conduct oral presentations</li> </ol>						
<b>Expected Course Outcomes:</b>						
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 resolution of the project.					K1-K4
5	Generate alternative solutions, compare them and select the optimum one.					K6
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>AIM OF THE PROJECT WORK</b>						
<ol style="list-style-type: none"> <li>1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.</li> <li>2. 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.</li> <li>3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.</li> </ol>						
<b>Viva Voce</b>						
<ol style="list-style-type: none"> <li>1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the <b>Annexure Report</b> available in the College, for a total of 150 marks at the last day of the practical session.</li> <li>2. Out of 150 marks, 60 marks for CIA and 90 for CEE (60 evaluation of project report + 30 Viva Voce).</li> </ol>						

<b>ProjectReportFormat</b>	
<b>PROJECTWORK</b> <b>TITLEOFTHEDISSERTATION</b>  BonafideWorkDonebyS TUDENT NAMEREG.NO.  Dissertationsubmittedin partialfulfillmentofthe requirementsfor theawardof <NameoftheDegree> ofBharathiarUniversity,Coimbatore-46.   CollegeLogo  Signatureof theGuide  Signatureof theHOD  SubmittedfortheViva-VoceExaminationheldon _____  InternalExaminer  ExternalExaminer  Month–Year	
<b>CONTENTS</b> <b>Acknowledgement</b> <b>Contents</b> <b>Synopsis</b> <b>1. Introduction</b> 1.1 OrganizationProfile 1.2 SystemSpecification 1.2.1 HardwareConfiguration 1.2.2 SoftwareSpecification <b>2. System Study</b> 2.1 Existing System	

<p>2.1.1 Drawbacks</p> <p>2.2 Proposed System</p> <p>2.2.1 Features</p> <p><b>3. System Design and Development</b></p> <p>3.1 File Design</p> <p>3.2 Input Design</p> <p>3.3 Output Design</p> <p>3.4 Database Design</p> <p>3.5 System Development</p> <p>3.5.1 Description of Modules (Detailed explanation about the project work)</p> <p><b>4. Testing and Implementation</b></p> <p><b>5. Conclusion</b></p> <p><b>Bibliography</b></p> <p><b>Appendices</b></p> <p>A. Data Flow Diagram</p> <p>B. Table Structure</p> <p>C. Sample Coding</p> <p>D. Sample Input</p> <p>E. Sample Output</p>
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

Coursecode		<b>ProgrammingLab– Graphics&amp;Multimedia</b>	L	T	P	C
<b>Core/Elective/Supportive</b>		<b>CoreLab :7</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>4</b>
<b>Pre-requisite</b>	Students should have the basic knowledge on C and C++ to do computer graphics and multimedia applications.	<b>Syllabus Version</b>	2021-22 Onwards			
<b>Course Objectives:</b>						
The main objectives of this course are to:						
<ol style="list-style-type: none"> <li>1. To learn the basic principles of 2-dimensional computer graphics.</li> <li>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.</li> <li>3. Provide an understanding of mapping from a world coordinate to device coordinates, clipping and projections.</li> <li>4. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization and business applications.</li> <li>5. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles and applications.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of computer graphics.					<b>K1</b>
2	Design scan conversion problems using C and C++ programming.					<b>K2</b>
3	Apply clipping and filling techniques for modifying an object.					<b>K3</b>
4	Understand the concepts of different type of geometric transformation of objects in 2D.					<b>K4</b>
5	Understand and develop the practical implementation of modeling, rendering, viewing of objects in 2D					<b>K6</b>
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create</b>						
<b>Programs</b>					<b>36 hours</b>	
<b>Graphics</b>						
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 draw 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 of a polygon.						
<b>Multimedia</b>						
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.						
<b>Total Lecture hours</b>					<b>36 hours</b>	

<b>TextBook(s)</b>	
1	
2	
<b>ReferenceBooks</b>	
1	
2	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>	
1	
2	
3	
CourseDesignedBy:	

<b>MappingwithProgrammeOutcomes</b>										
<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	M	M	M	S	M	L	L	M	L
<b>CO2</b>	S	S	S	M	M	M	M	M	M	L
<b>CO3</b>	S	S	S	M	S	M	M	M	M	L
<b>CO4</b>	S	S	S	S	S	M	M	M	M	M
<b>CO5</b>	S	S	S	S	S	M	S	S	S	M

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



Coursecode	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		
<b>Course Objectives:</b>								
The main objectives of this course are to:								
<ol style="list-style-type: none"> <li>1. To identify various components in a data communication system and understand state-of-the-art in network protocols, architectures and applications.</li> <li>2. To enable students through the concepts of computer networks, different models and their involvement in each stage of network communication.</li> <li>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.</li> <li>4. To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.</li> <li>5. Introduce the student to 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.</li> </ol>								
<b>Expected Course Outcomes:</b>								
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 resolved 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	
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>								
<b>Unit:1</b>	<b>BASIC SOF NETWORKS AND OSI MODEL</b>					<b>15hours</b>		
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: OS Reference Model – TCP/IP Reference Model – Comparison of OSI and TCP/IP – Critique of OSI and protocols – Critique of the TCP/IP Reference model.								
<b>Unit:2</b>	<b>PHYSICAL LAYER</b>					<b>15hours</b>		
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.								
<b>Unit:3</b>	<b>DATA-LINK LAYER</b>					<b>15hours</b>		
DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – Sliding								

WindowProtocols.MEDIUM-ACCESSCONTROLSUBLAYER:MultipleAccessProtocols–Ethernet–Wireless LANs–Broadband Wireless –Bluetooth.		
<b>Unit:4</b>	<b>NETWORKLAYER</b>	<b>15hours</b>
NETWORKLAYER:Routingalgorithms–CongestionControlAlgorithms.TRANSPORTLAYER:Elements ofTransport Protocols–Internet Transport Protocols:TCP.		
<b>Unit:5</b>	<b>APPLICATIONLAYER</b>	<b>12hours</b>
APPLICATIONLAYER:DNS–E-mail.NETWORKSECURITY:Cryptography–SymmetricKeyAlgorithms– PublicKey Algorithms– Digital Signatures.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars -webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	Computer Networks, Andrew S. Tanenbaum, 4th edition, PHI. (UNIT-I:1.2-1.4 UNIT-II:2.2-2.4UNIT-III:4.2-4.6UNIT-IV:5.2,5.3,6.2,6.5 UNIT-V:7.1,7.2,8.1-8.4)	
<b>ReferenceBooks</b>		
1	DataCommunicationandNetworks,AchyutGodbole,2007,TMH.	
2	ComputerNetworks:Protocols,Standards,andInterfaces,UylessBlack,2nded,PHI	
3		
<b>RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]</b>		
1		
2		
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CourseDesignedBy:		

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

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



Coursecode	SoftwareQualityAssurance		L	T	P	C
Core/Elective/Supportive	Elective:II		5	0	0	4
Pre-requisite	BasicknowledgeinSoftwareprojects		Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives ofthis courseareto:						
<ol style="list-style-type: none"> <li>1. Toenable thestudents tolearntheConcepts andPrinciples ofSQA.</li> <li>2. Tolearn theprinciplesofSQAandmust be ableto judge thequality of software.</li> <li>3. Tolearn</li> </ol>						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessfulcompletion ofthecourse, studentwill beable to:						
1	Understandthebasicsofsoftwarequality,modeling,andsoftwarequalityassuranceplanning software.					K1,K2
2	Knowledgeonsoftware qualityassuranceplan,quality tasksand documentation.					K2, K3
3	Understandthestandards,practices,metrics,softwareinspectionprocess,ISOCMM.					K3
4	Understandthetoolsand techniquesinsoftwarequalitycontrol,maintenanceandtraining,risk management.					K3
5	Knowledge in software quality standards and standard ISO 9000 model and itsweakness,SPICE.					K4
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 –Create</b>						
<b>Unit:1</b>	<b>Introduction toSoftwareQuality</b>				<b>15hours</b>	
Introduction to software quality – Software modeling – Scope of the software quality program – Establishing quality goals – Purpose, quality of goals – SQA planning software – Productivity anddocumentation.						
<b>Unit:2</b>	<b>SoftwareQualityAssurancePlan</b>				<b>15hours</b>	
Softwarequalityassuranceplan–PurposeandScope,Softwarequalityassurancemanagement-Organization– Quality tasks– Responsibilities –Documentation.						
<b>Unit:3</b>	<b>Standards,PracticesandManagement</b>				<b>15hours</b>	
Standards,Practices,ConventionsandMetrics,ReviewsandAudits–Management,Technical review–Softwareinspectionprocess–Walkthroughprocess–Auditprocess–Testprocesses–ISO,CMM compatibility– Problemreporting andcorrectiveaction.						
<b>Unit:4</b>	<b>SoftwareQualityControlandManagement</b>				<b>15hours</b>	
Tools,Techniquesandmethodologies,Codecontrol,Mediacontrol,Suppliercontrol,Recordscollection, Maintenanceand retention, Training andrisk management.						
<b>Unit:5</b>	<b>Standards</b>				<b>12hours</b>	
ISO9000model,CMMmodel,Comparisons,ISO9000weaknesses,cmmweaknesses,SPICE– Softwareprocess improvement and capability determination.						

<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	MordechaiBen,MeachemandGarryS.Marliss,SoftwareQuality– ProducingPractical,ConsistentSoftware,InternationalThompson Computer Press, 1997	
2	Watt.S.Humphrey,ManagingSoftwareProcess,AddisonWesley,1998.	
<b>ReferenceBooks</b>		
1	Philip.B.Crosby,QualityisFree:TheArtofMakingQualityCertain,MassMarket,1992.	
2		
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
2		
3		
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	L	S	S	S	M	M
CO2	S	S	S	M	L	M	S	M	S	S
CO3	S	S	S	L	L	M	S	M	S	S
CO4	S	S	M	L	M	M	S	M	S	S
CO5	S	M	S	L	L	M	S	M	S	S

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

Coursecode	Management Information Systems			L	T	P	C	
Core/Elective/Supportive	Elective-II			5	0	0	4	
Pre-requisite	Basics of information management and organization structure			Syllabus Version		2021-22 Onwards		
<b>Course Objectives:</b>								
The main objectives of this course are to: <ol style="list-style-type: none"> <li>1. To enable the student to learn the management information system concepts.</li> <li>2. To study the organization structure, development of MIS, applications of MIS and DSS.</li> <li>3. To learn the business process reengineering, data warehouse and electronic business technology.</li> </ol>								
<b>Expected Course Outcomes:</b>								
On the successful completion of the course, student will be able to:								
1	Understand the management information system concept, role of MIS and approaches to management.						K2	
2	Understand the organization structure and the basics of MIS.						K2, K3	
3	Understand and analyse the system design, development of MIS, applications of MIS and decision support systems.						K3	
4	Understand the enterprise management systems, database management, OOT and client server architecture.						K4	
5	Knowledge in business process reengineering, data warehouse and electronic business technology.						K4	
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>								
<b>Unit:1</b>	<b>Introduction</b>					<b>15hours</b>		
MIS Concept – MIS Definition – Role of the MIS – Impact of the MIS – MIS and Computer. Role and Importance of Management – Introduction Approaches to Management – Functions of the Manager – Management as a Control System – Process of Management								
<b>Unit:2</b>						<b>15hours</b>		
Organization Structure and Theory – Strategic Management of Business: Basics of Management Information Systems: Decision Making – Information Systems.								
<b>Unit:3</b>						<b>15hours</b>		
System Analysis and Design – Development of MIS – Choice of Information Technology – Applications of Management Information System – Decision Support Systems								
<b>Unit:4</b>						<b>15hours</b>		
Enterprise Management Systems – Technology of Information Systems – Database Management Systems – Object Oriented Technology (OOT): Conceptual Presentation – Client Server Architecture.								
<b>Unit:5</b>						<b>12hours</b>		
Networks – Business Process Re-Engineering (BPR) – Data Warehouse: Architecture to								

Implementation–ElectronicBusinessTechnology.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	W.S.Jawadekar,ManagementInformationSystems,2ndEdition,TataMcGrawHill	
2		
<b>ReferenceBooks</b>		
1	RobertSchultheis,MarySumner,ManagementInformationSystem,4thEdition,TMH	
2		
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
CourseDesignedBy:		

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

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

Coursecode	WirelessMobileCommunications		L	T	P	C
Core/Elective/Supportive	Elective-II		5	0	0	4
Pre-requisite	Basics of computer network communications		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
The main objectives of this course are to: 1.						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understand the basics of wireless communication systems, trends in cellular radio and personal communications and modern wireless communication systems.					K2
2	Knowledge in wireless transmission, medium access control, telecommunication systems.					K2, K3
3	Understand the design fundamentals, channel assignment strategies and improving the coverage and capacity of cellular networks.					K2, K3
4	Understand the wireless networking, traffic routing in wireless networks, wireless data services and protocols for network access.					K2-K4
5	Knowledge in wireless systems standards and scripting language for wireless communications.					K2-K4
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>Introduction</b>				<b>15hours</b>	
Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication - Applications - Comparison of common wireless Communication Systems - Trends in Cellular Radio and Personal Communications-Modern wireless Communication Systems						
<b>Unit:2</b>	<b>Wireless Transmission</b>				<b>15hours</b>	
Wireless Transmission: Frequencies for Radio transmission - Signals - Antennas - Signal Propagation - Multiplexing - Modulation - Spread Spectrum - Medium access control: Specialized MAC - SDMA - FDMA - TDMA - CDMA - FHMA - Radio Packet. TeleCommunication Systems : GSM - DECT - TETRA - UTMS-PACS - Personal Handy Phone System ( PHS ) - Pacific Digital Cellular ( PDC ) and IMT 2000.						
<b>Unit:3</b>	<b>Design fundamentals</b>				<b>15hours</b>	
The Cellular Concept - System Design fundamentals : Introduction - Frequency Reuse - Channel Assignment Strategies - Interference and System capacity - Trunking and Grade of Service - Improving coverage & Capacity in Cellular Systems.						
<b>Unit:4</b>	<b>Wireless Networking</b>				<b>15hours</b>	
Wireless Networking: Introduction to wireless Networks - Differences between wireless and fixed telephone Networks - Development of Wireless Networks - Traffic Routing in Wireless Networks - Wireless Networks - Wireless Data Services - CCS - ISDN - Signaling system No: 7 ( SS7 ) - PCS / PCNs - Protocols for Network Access - Network Databases.						

<b>Unit:5</b>	<b>Wireless Systems and Standards</b>	<b>12hours</b>
Wireless Systems and Standards: AMPS and ETACS - CDMA Digital Cellular standard (15 – 95) - Reverse CDMA channel- Scripting languages for Wireless Communication- An overview- components.		
<b>Unit:6</b>	<b>Contemporary Issues</b>	<b>3hours</b>
Expert lectures, online seminars – webinars		
<b>Total Lecture hours</b>		<b>75hours</b>
<b>Text Book(s)</b>		
1	Odore W. Rapport - Wireless Communications - Principles and Practice, Second Edition, 2002, Pearson Education.	
2	Jochen Schillr- Mobile Communication, Addison Wesley, 2000.	
<b>Reference Books</b>		
1	Stallings– Wireless Communications & Networks, Pearson Education	
2	GARG– Wireless Network Evolution :2G to 3G, Pearson Education.	
3	Richharia– Mobile Satellite Communications: Principles and Trends, Pearson Education	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
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Course Designed By:		

<b>Mapping with Programme Outcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	M	S	M	S	S	S	M	M
<b>CO2</b>	S	S	S	M	M	M	S	M	S	S
<b>CO3</b>	S	S	S	M	M	M	M	M	S	S
<b>CO4</b>	M	S	S	M	M	M	M	M	S	S
<b>CO5</b>	M	M	S	M	M	M	M	M	S	S

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

Coursecode	ComponentTechnologies	L	T	P	C
Core/Elective/Supportive	Elective–III	5	0	0	4
Pre-requisite	Basicsofinformationsystemanddistributedsystem	Syllabus Version		2021-22 Onwards	
<b>CourseObjectives:</b>					
Themain objectives ofthis courseareto: 1. Toenablethestudentstolearn theconceptsof componenttechnologies. 2. TolearntheCORBAarchitectureandservices,CCRBAandCORBA migrationprocess.					
<b>ExpectedCourseOutcomes:</b>					
Onthesuccessful completion ofthecourse,student willbe ableto:					
1	Understandthe basicsofinformationsystem, overviewof CORBA.				<b>K2</b>
2	Understand the language mapping, OLE integration, CCRBA services, information,task,systemmanagementand infrastructureservices.				<b>K3</b>
3	Knowledgeonfacilitiesanddomains,OMGprocessandrelationshipwithother technologies.				<b>K3</b>
4	UnderstandtheCORBA migrationprocess,softwarearchitectureand applicationdesignusing software architect II.				<b>K4</b>
5	Knowledgeonproblem andobjectivestandard basedprofile, businessobjectsandprocessand interfacemigration.				<b>K6</b>
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze; K5-Evaluate;K6–Create</b>					
<b>Unit:1</b>	<b>Introduction</b>	<b>15hours</b>			
Informationssystem-AnalyzingtheScenariochallenges-CORBAoverview-Concepts-Overview of CORBA IDL - IDL Tutorial Conversion of OO design to IDL - IDL Guidelines - OverviewofCORBAandStandardObjectmodel-Architecture- Clients&ObjectImplementationinterfaceand implementation.					
<b>Unit:2</b>	<b>ManagementServices</b>	<b>15hours</b>			
Languagemapping-Portabilityandinteroperability-OLEintegration-CCRBAservices-Information Management Services - Task Management- System Management - Infrastructure ofServices.					
<b>Unit:3</b>	<b>Facilities, Domains and Relationship with otherTechnologies</b>	<b>15hours</b>			
Facilitiesanddomains-horizontal-Verticalfacilities-LeveragingtheOMGProcess-Relationshipwith othertechnologies.					
<b>Unit:4</b>	<b>SoftwareArchitecture</b>	<b>15hours</b>			
TheCORBAmigrationprocess-softwareArchitecture-ApplicationsDesignusingsoftwareArchitectii					
<b>Unit:5</b>	<b>Migration CaseStudies</b>	<b>12hours</b>			

Migrationcasestudies-ProblemandObjectivestandardbasedProfile-Projectcontext-Businessobjectsand Process-Interfacemigration.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
<b>TotalLecturehours</b>		<b>75hours</b>
<b>TextBook(s)</b>		
1	InsideCORBA—DistributedObjectStandardsandApplicationsThomasJ.owtray,William A.Roh. AddisonWesley1999.	
2		
<b>ReferenceBooks</b>		
1		
2		
3		
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
1		
CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	M	S	M	S	S	S	M	M
<b>CO2</b>	S	S	S	M	M	M	S	M	S	S
<b>CO3</b>	S	S	S	M	M	M	M	M	S	S
<b>CO4</b>	S	S	S	M	M	M	M	M	S	S
<b>CO5</b>	S	S	S	M	M	M	M	M	S	S

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



Coursecode	Mastering LAN & Troubleshooting		L	T	P	C
Core/Elective/Supportive	Elective-III		5	0	0	4
Pre-requisite	Basics of computer networks		Syllabus Version		2021-22 Onwards	
<b>Course Objectives:</b>						
The main objectives of this course are to: <ol style="list-style-type: none"> <li>1. To enable the student to learn LAN setup and troubleshooting techniques.</li> <li>2. To understand the peripheral devices and controllers.</li> <li>3. To obtain knowledge in installation steps and diagnostic tools.</li> </ol>						
<b>Expected Course Outcomes:</b>						
On the successful completion of the course, student will be able to:						
1	Understanding the basics of computer organization, interconnection of devices, I/O data transfer and DMA.					K2
2	Understand the peripheral devices floppy drive controller, hard disk controller, display adapter, CRT controller, and printer controller.					K2, K3
3	Understand the motherboard circuits, functions, intercommunications, SMPS.					K3
4	Knowledge on installation planning, practice, HD upgradation and preventive maintenance.					K4
5	Knowledge on computer faults, types of faults, troubleshooting in printer, monitor, motherboard, etc, diagnostic tools.					K4
<b>K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create</b>						
<b>Unit:1</b>	<b>INTRODUCTION</b>				<b>15hours</b>	
PC- Hardware overview Introduction to computer organization-Memory-PC family-PC hardware interconnections between Boxes- Inside the boxes:- motherboard, daughterboards, floppy disk drive, HDD, speaker, mode switch, front panel indicators & Control-mother board logic memory space-I/O port address-wait state-interrupts-I/O data transfer-DMA channels-POST sequence						
<b>Unit:2</b>	<b>PERIPHERAL DEVICES</b>				<b>15hours</b>	
Floppy drive controller-Overview-Disk format-FDC system interface-FDD interface Hard Disk controller-overview-Disk Drives and interface-controller post description Hard disk card-Hard disk format. Display Adapter:-CRT display- CRT controller principle -CRT controller 6845 Printer controller:- Centronics interface-programming sequence-Hardware overview printer-sub assemblers.						
<b>Unit:3</b>	<b>MOTHERBOARD CIRCUITS</b>				<b>15hours</b>	
Motherboard functions-functional units and intercommunications:-Reset logic-CPU nucleus logic-DMA logic-Wait state logic-NM logic-speaker logic-keyboard interface-SMPS.						
<b>Unit:4</b>	<b>INSTALLATION AND MAINTENANCE</b>				<b>15hours</b>	
Introduction-pre installation planning-installation practice-routine checks-special configuration memory upgradation-HD upgradation-DOS command (Internal and external). Preventive maintenance-system usage.						

<b>Unit:5</b>	<b>TROUBLESHOOTING</b>	<b>12hours</b>
Computer faults-nature of faults -types of faults -diagnostic programs and tools-fault elimination-systematic trouble shooting procedure mother board problem-serial port problems-FDC, HDC,displayproblems-displayadapter-printer problem -monitorproblems, HDC,FDCproblems.		
<b>Unit:6</b>	<b>ContemporaryIssues</b>	<b>3hours</b>
Expertlectures,onlineseminars –webinars		
	<b>TotalLecturehours</b>	<b>75hours</b>
<b>TextBook(s)</b>		
1	B.Govindaraulu-"IBMPCandClones",TataMcGrawHill Co.1995	
2	RobertCBrenner -"IBMPCTrouble shootingand Repairguide", BPBpublications.	
<b>ReferenceBooks</b>		
1	Winn&Rosch -"Hardware Bible", Tecmedia	
2	Zacker – —Upgrading & Trouble shooting Networks – the complete referencell, Tata McGraw Hilledition.	
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>		
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CourseDesignedBy:		

<b>MappingwithProgrammeOutcomes</b>										
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	M	S	S	S	M	M
<b>CO2</b>	S	S	S	M	S	M	S	M	S	S
<b>CO3</b>	S	S	S	M	S	M	M	M	S	S
<b>CO4</b>	S	S	S	M	S	M	M	M	S	S
<b>CO5</b>	S	S	S	M	S	M	M	M	S	S

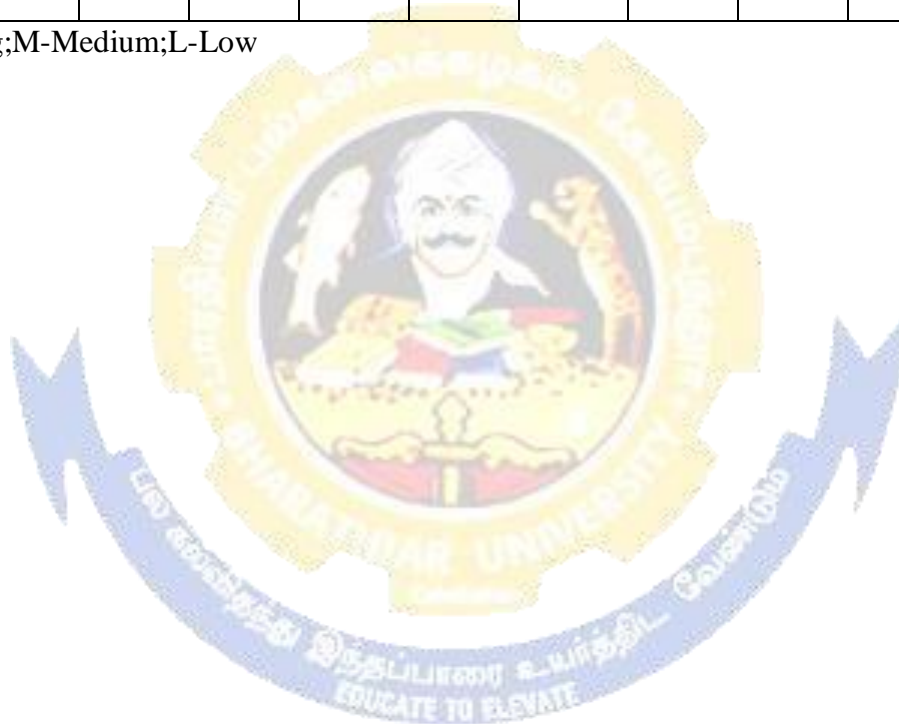
\*S-Strong;M-Medium;L-Low

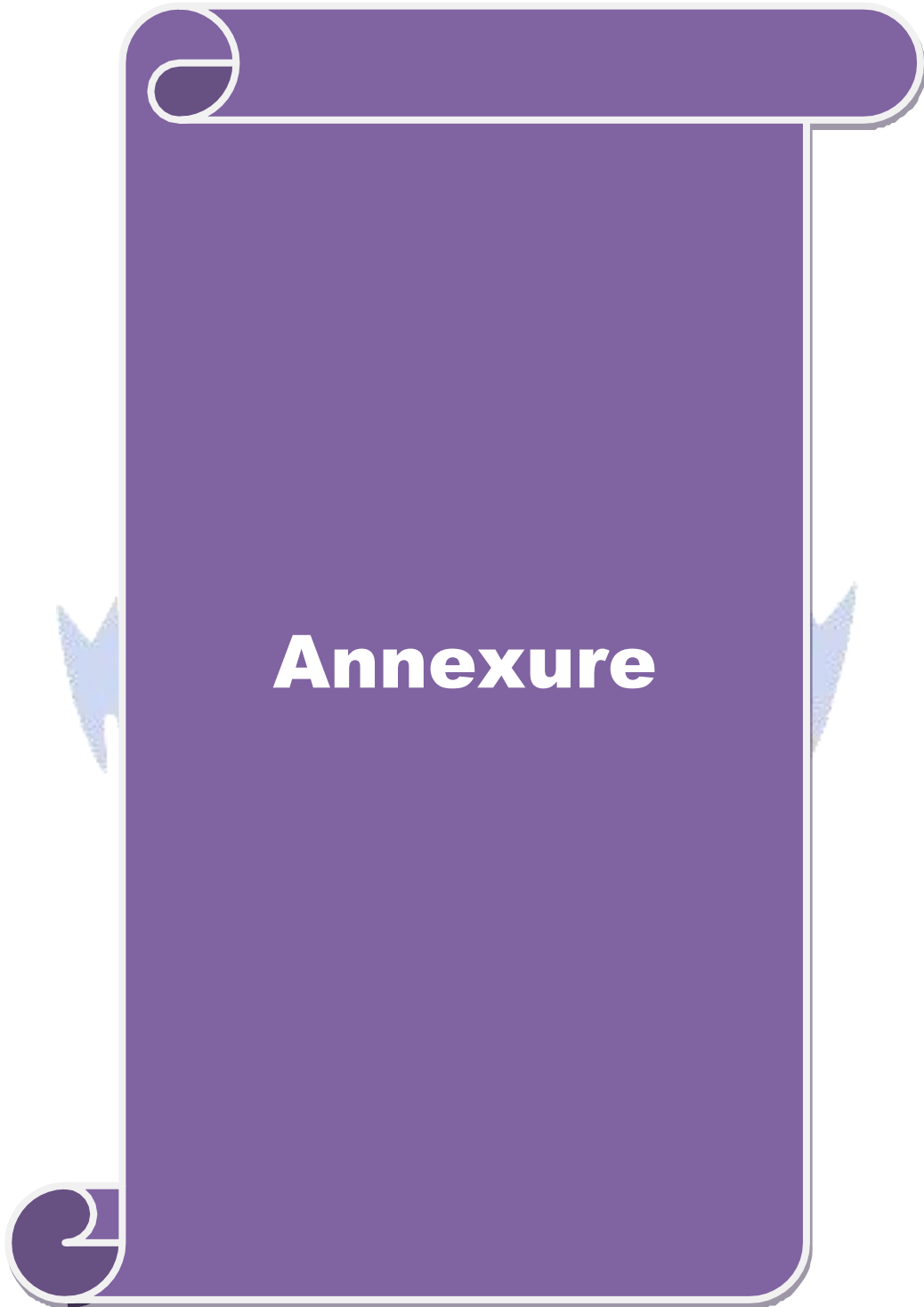
<b>Coursecode</b>		<b>ASP.NET Lab</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/Elective/Supportive</b>		<b>SkilledBasedSubject4(Lab)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Pre-requisite</b>	StudentsshouldhaveprogrammingskillinASP.NET		<b>Syllabus Version</b>		2021-22 Onwards	
<b>CourseObjectives:</b>						
Themain objectives of this courseareto: 1. ToenablethestudentstolearnaboutASP.NETtodevelopwebformswithdatabaseconnectivity,how to do session tracking and management. 2. TolearnaboutwebservicesandtheroleofWSDLandSOAPindevelopingwebservices.						
<b>ExpectedCourseOutcomes:</b>						
Onthesuccessful completion of thecourse,student willbe ableto:						
1	Understandingthebasicsof.Net,developmentenvironment.OverviewofASP.NETandprogramflow.					<b>K1-K2</b>
2	KnowledgeonASP.NETandVB.NETandbuilt inobjects.					<b>K2</b>
3	Understandwebforms,ASP.NETconfiguration,stateandsessionmanagements.					<b>K3</b>
4	Understandingscriptingobjectmodels,activeservercomponentsandcontrols.					<b>K4</b>
5	Knowledgeonwebservices,developingwebapplications,datacentricwebapplicationsusing ADO.NET.					<b>K4-K6</b>
<b>K1-Remember; K2-Understand; K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create</b>						
1.Designa personalwebpageusingASP.						
2.Designa data entryform inASP						
3.WriteaPrograminASPtogetdatausingaform,validatethedataandreturnsthesamedataforcorrectionif any using the same form.						
4.Writeaprogramin ASP to displaytheSessionproperties.						
5.Writeaprogram inASPthat makes useofAd Rotatorcomponent.						
6.Writeaprogram in ASP that makesuse ofBrowserCapabilities component.						
7.Writeaprogramin ASP that makesuse ofContent Rotatorcomponent.						
8.Writeaprogramin ASP that makesuse ofpagecountercomponent.						
9.Writeaprogram inASPto getthe dataofstudentsusing forms andstores themin database.						
10.WriteaprograminASP toperform recordnavigationusing aform.						
			<b>TotalLecturehours</b>		<b>hours</b>	
<b>TextBook(s)</b>						
1	DaveMercer,—ASP.NETABeginner’sGuidel, TataMcGraw–HillPub.CompanyLtd,2002					
2	MattJ.Couch,—ASP.NETandVB.NETWebprogramming—, Pearson Education,2002					
<b>ReferenceBooks</b>						
1	KirkAllenEvans,AshwinKamanna,JoelMueller,—XMLandASP.NETI,PearsonEducation,2002.					
<b>RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]</b>						

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CourseDesignedBy:	

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

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





**BHARATHIAR UNIVERSITY :: COIMBATORE**  
**641046 DEPARTMENT OF SOFTWARE SYSTEM**

**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.

