

B.Sc.COMPUTERSCIENCE

Syllabus

AFFILIATEDCOLLEGES

Program Code:22K

2021–2024 Batch



BHARATHIARUNIVERSITY

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

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

Coimbatore- 641 046, Tamil Nadu, India

Program Educational Objectives (PEOs)	
The B. Sc. Computer Science program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO1	To enrich knowledge in core areas related to the field of computer science and mathematics.
PEO2	To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0 tools and techniques and thereby design and implement software projects to meet customer's business objectives.
PEO3	To enable graduates to pursue higher education leading to Master and Research Degrees or have a successful career in industries associated with Computer Science or as entrepreneurs
PEO4	To enhance communicative skills and inculcate team spirit through professional activities, skills in handling complex problems in data analysis and research project to make them a better team player.
PEO5	To embed human values and professional ethics in the young minds and contribute towards nation building.
PEO9	To develop project



Program Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Computer Science program, the students are expected to	
PSO1	Impart the fundamental principles and methods of Computer Science to a wider range of applications.
PSO2	Develop and deploy applications of varying complexity using the acquired knowledge in various programming languages, data structures and algorithms, database and networking skills.
PSO3	To investigate, analyze complex problems by the application of suitable mathematical and research tools, to design Information Technology products and solutions
PSO4	To identify and utilize the state-of-the-art tools and techniques in the design and development of software products and solutions.
PSO5	Ability to identify, interpret, analyze and design solutions using appropriate algorithms of varying complexities in the field of information and communication technology.



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

(Forthestudentsadmittedfromtheacademicyear2021-2022andonwards)

SchemeofExamination

Part	TitleoftheCourse	Hours/ Week	Examination				Credits
			Duration inHours	MaximumMarks			
				CIA	CEE	Total	
	SemesterI						
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
	Total	30		300	350	650	26
	SemesterII						
I	Language–II	6	3	50	50	100	4
II	English–II	6	3	50	50	100	4
III	Core3:C++Programming	5	3	50	50	100	4
III	CoreLab2: ProgrammingLab-C++	4	3	50	50	100	4
III	CoreLab3:Internet Basics	2	3	25	25	50	2
III	Allied2:DiscreteMathematics	5	3	50	50	100	4
IV	ValueEducation– HumanRights*	2	3	-	50	50	2
	Total	30		275	325	600	24
	SemesterIII						
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:SoftwareEngineering andSoftwareProjectManagement	5	3	30	45	75	3
IV	Tamil**/ AdvancedTamil*(OR)Non- majorelective-I(Yoga forHuman Excellence)* / Women’s Rights*	2	3	-	50	50	2
	Total	30		230	295	525	21
	SemesterIV						
III	Core6: SystemSoftwareand OperatingSystem	6	3	50	50	100	4
III	Core7:LinuxandShellProgramming	6	3	50	50	100	4
III	CoreLab 5:Linux and ShellProgrammingLab	3	3	25	25	50	2
	NaanMuthalvan – Skill Course Office Fundamentals - Lab http://kb.naanmudhalvan.in/Bharathiar_University_(BU)	3		25	25	50	2
III	Allied4:BusinessAccounting	6	3	50	50	100	4
III	SkillbasedSubject 2Lab:SoftwareProjectManagement-Lab	4	3	30	45	75	3
IV	Tamil**/Advanced Tamil* (OR) Non- majorelective-II(GeneralAwareness*)	2	3	-	50	50	2
	Total	30		230	295	525	21

SemesterV							
III	Core8:RDBMS&Oracle	6	3	50	50	100	4
III	Core9:VisualBasic	6	3	50	50	100	4
III	Core6:ProgrammingLab –VB&Oracle	6	3	50	50	100	4
III	Elective - I PYTHON Programming/ComputerNetworks/Organizational Behavior	6	3	50	50	100	4
III	SkillbasedSubject 3: SoftwareTesting	6	3	30	45	75	3
	Total	30		230	245	475	19
SemesterVI							
III	Core10:Graphics&Multimedia	5	3	50	50	100	4
III	Core11:Project WorkLab%%	5	3	60	90	150	6
III	CoreLab7: Programming Lab –Graphics &Multimedia	5	3	50	50	100	4
III	Elective–II:NetworkSecurityand Cryptography / Artificial Intelligence andExpert Systems / WebTechnology	5	3	50	50	100	4
III	Elective–III:Data Mining/Open Source Software/ Internet ofThings (IoT)	5	3	50	50	100	4
III	SkillBasedSubject4(Lab): SoftwareTestingLab	3	3	30	45	75	3
	Naan Muthalvan – Skill Course Cyber Security @ http://kb.naanmudhalvan.in/images/7/71/Cybersecurity.pdf (or) Machine Learning # http://kb.naanmudhalvan.in/images/1/19/PBL_Google.pdf (or) Android APP Development \$ http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf	2		25	25	50	2
V	ExtensionActivities**		-	50	-	50	2
	Total	30		365	360	725	29
	GrandTotal			1630	1870	3500	140

➤ *NoContinuousInternalAssessment(CIA),UniversityExaminationsOnly.

➤ **NoUniversityExaminations,ContinuousInternalAssessment(CIA)Only.

➤ # 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.



First Semester

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- 2022 Onwards	
Course Objectives:						
The main objectives of this course are to:						
1. To impart knowledge about Computer fundamentals						
2. To understand the concepts and techniques in C Programming						
3. To equip and indulge themselves in problem solving using C						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Learn about the Computer fundamentals and the Problem solving					K2
2	Understand the basic concepts of C programming					K2
3	Describe the reason why different decision making and loop constructs are available for iteration in C					K3
4	Demonstrate the concept of User defined functions, Recursions, Scope and Lifetime of Variables, Structures and Unions					K4
5	Develop C programs using pointers Arrays and file management					K3
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Unit:1		Fundamentals of Computers & Problem Solving in C	12 hours			
Fundamentals of Computers : Introduction – History of Computers-Generations of Computers- Classification of Computers-Basic Anatomy of a Computer System-Input Devices-Processor- Output Devices-Memory Management – Types of Software- Overview of Operating System- Programming Languages-Translator Programs-Problem Solving Techniques-Overview of C.						
Unit:2		Overview of C	15 hours			
Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators-Arithmetic Expressions-Evaluation of expression- precedence of arithmetic operators - Type conversion in expression – operator precedence & associativity-Mathematical functions-Reading & Writing a character-Formatted input and output.						
Unit:3		Decision Making, Looping and Arrays	15 hours			
Decision Making and Branching: Introduction – if, if....else, nesting of if ...else statements- else if ladder – The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops.Arrays–Character Arrays and Strings						
Unit:4		User-Defined Functions, Structures and Unions	15 hours			
User-Defined Functions: Introduction–Need and Elements of User-Defined Functions-Definition- Return Values and their types-Function Calls–Declarations–Category of						

Functions-Nesting of Functions-Recursion-Passing Arrays and Strings to Functions-The Scope, Visibility and Lifetime of Variables-Multifile Programs. Structures and Unions		
Unit:5	Pointers&File Management	15hours
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 – Pointer to Functions–Pointers and Structures.File Management in C.		
Unit:6	Contemporary Issues	3hours
Problem Solving through C Programming-Edureka		
	Total Lecture hours	75hours
Text Book(s)		
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008	
Reference Books		
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.	
2	Henry Mullish & Hubert L. Cooper: The Spirit of C, Jaico, 1996.	
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Introduction to Programming in C-NPTEL	
2	Problem solving through Programming in C -SWAYAM	
3	C for Everyone: Programming Fundamentals-Coursera	
Course Designed By:		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	L
CO3	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		
Course Objectives:						
On successful completion of this subject the student should have Knowledge on						
1. To familiarize with different number systems and digital arithmetic & logic circuits						
2. To understand the concepts of Combinational Logic and Sequential Circuits						
3. To impart the knowledge of buses, I/O devices, flipflops, Memory and bus structure.						
4. To understand the concepts of memory hierarchy and memory organization						
5. To understand the various types of microprocessor architecture						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Learn the basic structure of number system methods like binary, octal and hexadecimal and understand the arithmetic and logical operations are performed by computers.					K3
2	Define the functions to simplify the Boolean equations using logic gates.					K1
3	Understand various data transfer techniques in digital computer and control unit operations.					K2
4	Compare the functions of the memory organization					K4
5	Analyze architectures and computational designs concepts related to architecture organization and addressing modes					K4
K1-Remember; K2 -Understand; K3 -Apply; K4 -Analyze; K5 -Evaluate; K6 -Create						
Unit:1						
Number System and Arithmetic circuits			12 hours			
Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, 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.						
Unit:2						
Combinational Logic and Sequential Circuits			14 hours			
Combinational Logic Circuits: Boolean algebra – Karnaugh map – Canonical form Construction and properties – Implementations – Don't care combinations – Product of sum, Sum of products, Simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder Encoder – Shift Registers - Counters.						
Unit:3						
Input – Output Organization and Data Transfer			12 hours			
Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking – Priority Interrupt: Daisy-Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication.						

Unit:4	MemoryOrganization	10hours
MemoryOrganization:MemoryHierarchy–MainMemory- Associativememory:HardwareOrganization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct,Set-associative Mapping – Writing into Cache Initialization. Virtual Memory: Address Space andMemorySpace,AddressMappingUsingPages,AssociativeMemory,PageTable,PageReplacement.		
Unit:5	CaseStudies	6hours
CASESTUDY :Pinoutdiagram,Architecture,Organizationandaddressingmodesof80286-80386- 80486-Introductionto microcontrollers.		
Unit:6	ContemporaryIssues	2hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	56hours
TextBook(s)		
1	Digitalprinciplesandapplications,AlbertPaulMalvino,DonaldP Leach,TMH,1996.	
2	ComputerSystemArchitecture-M.MorrisMano, PHI.	
3	MicroprocessorsanditsApplications-RameshS.Goankar	
ReferenceBooks		
1	DigitalElectronicsCircuitsandSystems,V.K.Puri,TMH.	
2	ComputerArchitecture, M.Carter,Schaum‘ soutlineseries,TMH.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1	https://nptel.ac.in/courses/106/103/106103068/	
2	http://www.nptelvideos.in/2012/12/digital-computer-organization.html	
3	http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf	
CourseDesignedBy:		

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
CO3	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

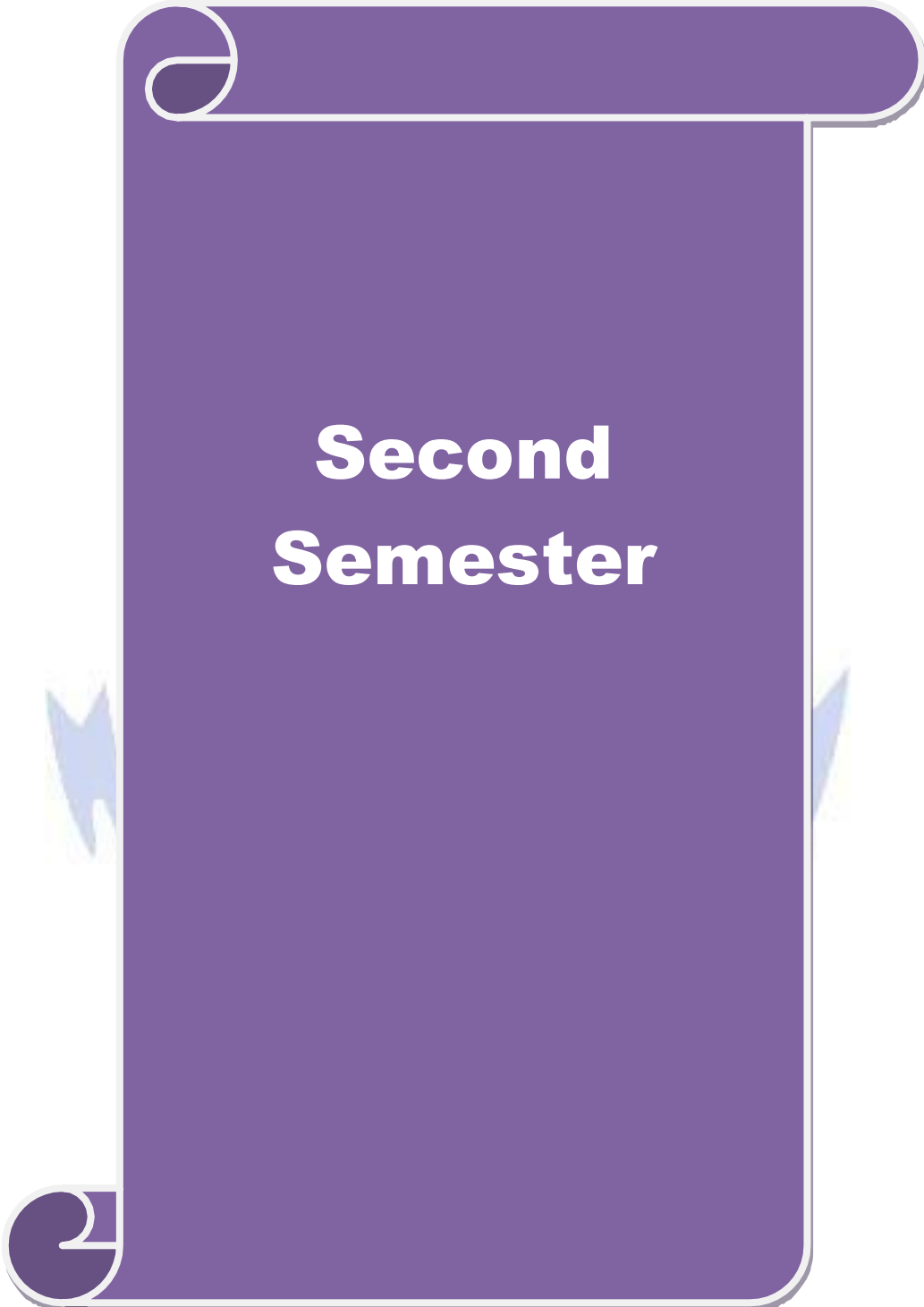
Coursecode		ProgrammingLab–C	L	T	P	C
Core/Elective/Supportive		CoreLab:1	0	0	3	4
Pre-requisite		StudentsshouldhavebasicknowledgeinCpro grammingand algorithms	Syllabus Version	2021-22 Onwards		
CourseObjectives:						
Themain objectives ofthis courseareto: 1. To practice the Basic concepts, Branching and Looping Statements and Strings in Cprogramming 2. ToimplementandgainknowledgeinArrays,functions,Structures,PointersandFile handling						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Remember and Understand the logic for a given problem and to generate Primenumbers& Fibonacci Series(Program-1,2,3)					K1, K2
2	Applytheconceptstoprint theMagicsquare,Sortingthedata,Strings,Recursivefunctionsand Pointers (Program-4,5,6,8,10)					K2, K3
3	Rememberthelogicused incounting thevowels inasentence(Program-7)					K1
4	ApplyandAnalyzetheconceptsofStructuresandFilemanagement (Program-9,11,12)					K3&K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Programs			36hours			
1.WriteaCprogram tofind thesum, average, standarddeviation for agiven set ofnumbers.						
2.WriteaCprogram togenerate n primenumbers.						
3.WriteaCprogram togenerate Fibonacciseries.						
4.WriteaC programto print magic squareof ordern wheren>3and n is odd.						
5.WriteaC programto sort thegiven set of numbersin ascending order.						
6. WriteaC program tocheck whetherthegiven stringis apalindromeor notusing pointers.						
7.WriteaCprogram tocount thenumber ofVowels inthe givensentence.						
8.WriteaC programto find thefactorialof agiven numberusing recursivefunction.						
9.Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5subjects in a structure. Create an array of structures and print the mark sheet in the universitypattern.						
10.Writeafunctionusingpointerstoaddtwomatricesandtoreturntheresultantmatrixtothecallingfunc tion.						
11.WriteaCprogramwhichreceivestwofilenamesasargumentsandcheckwhetherthefilecontentsare ameornot.Ifsame delete thesecondfile						
12.Writeaprogramwhichtakesafileascommandlineargumentandcopyittoanotherfile.Attheend ofthesecond filewritethetotal i) noofchars ii) no.ofwordsand iii)no.of lines.						
			TotalLecturehours		36hours	
TextBook(s)						
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, SecondReprint 2008					

ReferenceBooks	
1	AshokNKamthane: Programmingwith ANSIand TurboC,Pearson, 2002.
2	HenryMullish& Hubert L.Cooper:TheSpritofC, Jaico,1996.
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	IntroductiontoProgramming inC–NPTEL
2	ProblemsolvingthroughProgramminginC -SWAYAM
3	CforEveryone: Programming Fundamentals – Course
CourseDesignedBy:	

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

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





Second Semester

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 Onward	
Course Objectives:						
The main objectives of this course are to:						
1. Impart knowledge of object-oriented programming concepts and implement them in C++						
2. Enable to differentiate procedure-oriented and object-oriented concepts.						
3. Equip with the knowledge of concept of inheritance so that learner understands the need of inheritance.						
4. Explain the importance of data hiding in object-oriented programming						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Define the different programming 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
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Unit:1						
INTRODUCTION TO C++			10hours			
Key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If.. Else, jump, goto, break, continue, Switch case statements-Loops in C++: for, while, do- functions in C++- inline functions – Function Overloading..						
Unit:2						
CLASSES AND OBJECTS			10hours			
Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects – friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.						
Unit:3						
OPERATOR OVERLOADING			12hours			
Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multipath						

inheritance–VirtualbaseClasses –AbstractClasses.		
Unit:4	POINTERS	13hours
Declaration–PointertoClass,Object– thispointer–Pointers toderivedclassesandBase classes –Arrays–Characteristics–arrayofclasses–Memorymodels–newanddeleteoperators–dynamicobject – Binding, Polymorphism and Virtual Functions.		
Unit:5	FILES	13hours
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.		
Unit:6	ContemporaryIssues	2hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	60hours
TextBook(s)		
1	AshokNKamthane,Object-OrientedProgrammingwithAnsiAndTurboC++,PearsonEducation,2003.	
ReferenceBooks		
1	E.Balagurusamy,Object-OrientedProgrammingwithC++,TMH,1998.	
2	MariaLitvin& GrayLitvin,C++foryou,Vikaspublishation,2002.	
3	JohnRHubbard,ProgrammingwithC,2nd Edition,TMHpublication,2002.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1	https://www.spoken-tutorial.org	
2	https://www.tutorialspoint.com/cplusplus/index.htm	
3	https://www.w3schools.com/cpp/	
CourseDesignedBy:		

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

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

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 Onward	
Course Objectives:						
The main objectives of this course are to:						
1. Impart knowledge of object-oriented programming concepts and implement them in C++						
2. Enable to differentiate procedure-oriented and object-oriented concepts.						
3. Equip with the knowledge of concept of Inheritance so that learner understands the need of inheritance.						
4. Explain the importance of data hiding in object-oriented programming						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Define the different programming 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
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Programs				36 hours		
1. Write a C++ Program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH() to insert an element and member function POP() to delete an element check for overflow and underflow conditions..						
2. Write a C++ Program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD(), SUB(), MUL(), DIV() to perform addition, subtraction, multiplication, division respectively. Write a member function to get and display values.						
3. Write a C++ Program to read an integer number and find the sum of all the digits until it reduces to a single digit using constructors, destructors and inline member functions.						
4. Write a C++ Program to create a class FLOAT that contains one float data member. Overload all the four Arithmetic operators so that they operate on the object FLOAT						
5. Write a C++ Program to create a class STRING. Write a Member Function to initialize, get and display strings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.						
6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA and						

PF depending on the grade.	
7. Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGLE from class Shape and Calculate Area and Perimeter of each class separately and display the result.	
8. Write a C++ Program to create two classes each class consists of two private variables, an integer and a float variable. Write member functions to get and display them. Write a FRIEND Function common to both classes, which takes the object of above two classes as arguments and the integer and float values of both objects separately and display the result.	
9. Write a C++ Program using Function Overloading to read two Matrices of different Data Types such as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually.	
10. Write a C++ Program to check whether the given string is a palindrome or not using Pointers	
11. Write a C++ Program to create a File and to display the contents of that file with line numbers.	
12. Write a C++ Program to merge two files into a single file.	
Text Book(s)	
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.
Reference Books	
1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.
2	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.
3	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
4	
Course Designed By:	

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

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

Coursecode		InternetBasics	L	T	P	C
Core/Elective/ Supportive		CoreLab :3	0	0	2	2
Pre-requisite		Knowledge of WINDOWS Operating Systems	Syllabus Version		2021-22 Onward	
CourseObjectives:						
The main objectives of this course are to:						
1. Introduce the fundamentals of Internet and the Web functions.						
2. Impart knowledge and essential skills necessary to use the internet and its various components.						
3. Find, evaluate, and use online information resources.						
4. Use Google Apps for education effectively.						
ExpectedCourseOutcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the fundamentals of Internet and the Web concepts					K2
2	Explain the usage of internet concepts and analyze its components.					K2
3	Identify and apply the online information resources					K3
4	Inspect and utilize the appropriate Google Apps for education effectively					K3, K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Programs			36hours			
1. Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC Options accordingly						
2. Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.						
3. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.						
4. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.						
5. Create a label and upload bulk contacts using import option in Google Contacts						
6. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.						
7. Create and share a folder in Google Drive using 'share link' option and set the permission to access that folder by your friends only.						
8. Create one-page story in your mother tongue by using voice recognition facility of Google Docs.						
9. Create a registration form for your Department Seminar or Conference using Google Forms.						
10. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.						
11. Create a Google form with minimum 25 questions to conduct a quiz and generate a						

certificate after submission.	
12. Create a meeting using Google Calendar and record the meeting 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	
Text Book(s)	
1	Ian Lamont, Google Drive & Docs in 30 Minutes, 2 nd Edition.
2	
Reference Books	
1	Sherry Kinkoph Gunter, My Google Apps, 2014.
2	
3	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v=NzPNk44tdlQ
2	https://www.youtube.com/watch?v=PKuBtQuFa-8
4	https://www.youtube.com/watch?v=hGER1hP58ZE
Course Designed By:	

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

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



Third Semester

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 Onward	
Course Objectives:						
The main objectives of this course are to:						
1. To introduce the fundamental concept of data structures						
2. To emphasize the importance of data structures in developing and implementing efficient algorithms.						
3. Understand the need for Data Structures when building application						
4. Ability to calculate and measure efficiency of code						
5. Improve programming logic skills.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of data structures and algorithms					K1-K2
2	Construct and analyze of stack and queue operations with illustrations					K2-K4
3	Enhance the knowledge of LinkedList and dynamic storage management.					K2-K3
4	Demonstrate the concept of trees and its applications					K2-K3
5	Design and implement various sorting and searching algorithms for applications and understand the concept of file organizations					K1-K4
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Unit:1	INTRODUCTION					15hours
Introduction of Algorithms, Analysing Algorithms. Arrays: Sparse Matrices - Representation of Arrays. Stacks and Queues. Fundamentals - Evaluation of Expression Infix to Postfix Conversion - Multiple Stacks and Queues						
Unit:2	LINKED LIST					12hours
Linked List: Singly Linked List - Linked Stacks and Queues - Polynomial Addition- More on Linked Lists - Sparse Matrices - Doubly Linked List and Dynamic – Storage Management - Garbage Collection and Compaction.						
Unit:3	TREES					15hours
Basic Terminology - Binary Trees - Binary Tree Representations – Binary Trees-Traversal- More On Binary Trees – Threaded Binary Trees - Binary Tree Representation of Trees - Counting Binary Trees. Graphs: Terminology and Representations - Traversals, Connected Components and Spanning Trees, Shortest Paths and Transitive Closure						
Unit:4	EXTERNAL SORTING					15hours
Storage Devices-Sorting with Disks: K-Way Merging – Sorting with Tapes Symbol Tables: Static Tree Tables-Dynamic Tree Tables-Hash Tables: Hashing Functions-Overflow Handling.						

Unit:5		INTERNALSORTING	15hours
InsertionSort-QuickSort-2WayMergeSort-HeapSort-ShellSort-SortingonSeveralKeys.Files:Files, QueriesandSequentialorganizations-IndexTechniques-FileOrganizations.			
Unit:6		ContemporaryIssues	3hours
Exptlectures,onlineseminars -webinars			
		TotalLecturehours	75hours
TextBook(s)			
1	EllisHorowitz,SartajShani,DataStructures,GalgotiaPublication.		
2	Ellis Horowitz, SartajShani, SanguthevarRajasekaran, Computer Algorithms, GalgotiaPublication.		
3	S.LovelynRose,R. Venkatesan,DataStructures,Wiley IndiaPrivateLimited,2015,1 st Edition		
ReferenceBooks			
1	Jean-Paul,Tremblay& Paul G.Sorenson , An Introduction to Data structures with ApplicationsTataMcGraw Hill Company 2008, 2ndEdition.		
2	Samanta.D,ClassicData StructurePrenticeHallof India PvtLtd 2007,9 th Edition		
3	SeymourLipschutz,DataStructuresMcGrawHillPublications,2014,1stEdition		
RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]			
1			
2			
3			
CourseDesignedBy:			

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

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

Coursecode		JavaProgramming	L	T	P	C
Core/Elective/Supportive		Core:5	6	0	0	4
Pre-requisite	Theobjectiveofthecourse istotrainthestudentstoacquireproblem-solving skills through objectorientedprogramming		Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. ToexposethestudentwiththeintroductiontoOOPsandadvantagesofobjectorientedprogramming. 2. Theconceptsof OOPsmakeiteasytorepresentreal worldentities. 3. Thecourseintroducetheconceptsofconvertingtherealtimeproblemsintoobjectsandmethodsand theirinteraction with one another to attain a solution. 4. SimultaneouslyitprovidesthesyntaxofprogramminglanguageJavaforsolvingtherealworldproblems.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Thecompetenceandthedevelopmentofsmalltomediumsizedapplication programsthatdemonstrateprofessionallyacceptablecoding					K1-K2
2	Demonstratethe conceptofobjectorientedprogrammingthrough Java					K2-K4
3	ApplytheconceptofInheritance,Modularity,Concurrency,Exceptions handling anddatapersistencetodevelopjavaprogram					K3
4	Developjavaprogramsforappletsandgraphics programming					K3
5	UnderstandthefundamentalconceptsofAWTcontrols,layoutsandevents					K1-K2
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1	FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING				15hours	
Object-OrientedParadigm–BasicConceptsofObject-OrientedProgramming–BenefitsofObject-OrientedProgramming–ApplicationofObject-OrientedProgramming.JavaEvolution:History – Features – How Java differs from C and C++ – Java and Internet – Java and www –WebBrowsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – JavaVirtualMachine.						
Unit:2	BRANCHINGANDLOOPING				12hours	
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 – JumpsinLoops -Labeled Loops– Classes, Objects andMethods.						
Unit:3	ARRAYSANDINTERFACES				15hours	
Arrays,StringsandVectors–Interfaces:MultipleInheritance–Packages:PuttingClasses together–MultithreadedProgramming.						

Unit:4	ERRORHANDLING	15hours
ManagingErrorsandExceptions –AppletProgramming –GraphicsProgramming.		
Unit:5	MANAGINGINPUT/OUTPUTFILES INJAVA	15hours
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.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	Programmingwith Java– APrimer-E. Balagurusamy,5 th Edition,TMH.	
2	HerbertSchildt,Java:TheCompleteReference, McGrawHillEducation,OraclePress10thEdition, 2018	
3	ProgrammingwithJava –A Primer-E.Balagurusamy, 3rdEdition, TMH.	
ReferenceBooks		
1	TheCompleteReferenceJava2-PatrickNaughton& HebertSchildt,3rdEdition,TMH	
2	ProgrammingwithJava– JohnR.Hubbard, 2ndEdition,TMH.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1	www.spoken-tutorial.org	
2	www.nptel.ac.in	
3	https://www.w3schools.in/java-tutorial/	
CourseDesignedBy:		

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

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

Coursecode		ProgrammingLab –JAVA	L	T	P	C
Core/Elective/Supportive		CoreLab:4	0	0	5	4
Pre-requisite		Students should know about the OOPs concept and basic knowledge in java theory.	Syllabus Version		2021-22 Onward	
Course Objectives:						
The main objectives of this course are to:						
3. The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.						
4. To practice the Basic concepts, Branching and Looping Statements and Strings in C programming						
5. To implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding					K1, K2
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping					K2
3	Create data files and Design a page using AWT controls and Mouse Events in Java programming. Implement the concepts of code reusability and debugging.					K2, K3
4	Develop applications using Strings, Interfaces and Packages and applets					K3
5	Construct Java programs using Multithreaded Programming and Exception Handling					K3
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Programs						
36 hours						
1. Write a Java 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 event with mouse such as mouseup, mousedown, 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.		
	Total Lecture hours	36 hours
Text Book(s)		
1	Programming with Java– A Primer–E. Balagurusamy, 5 th Edition, TMH.	
2	Herbert Schildt , Java: The Complete Reference, McGraw Hill Education, Oracle Press 10 th Edition, 2018	
3	Programming with Java– A Primer– E. Balagurusamy, 3 rd Edition, TMH.	
Reference Books		
1	The Complete Reference Java 2–Patrick Naughton & Herbert Schildt, 3 rd Edition, TMH	
2	Programming with Java– John R. Hubbard, 2 nd Edition, TMH.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.w3resource.com/java-exercises/	
2	https://www.udemy.com/introduction-to-java-programming/	
3		
Course Designed By:		

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

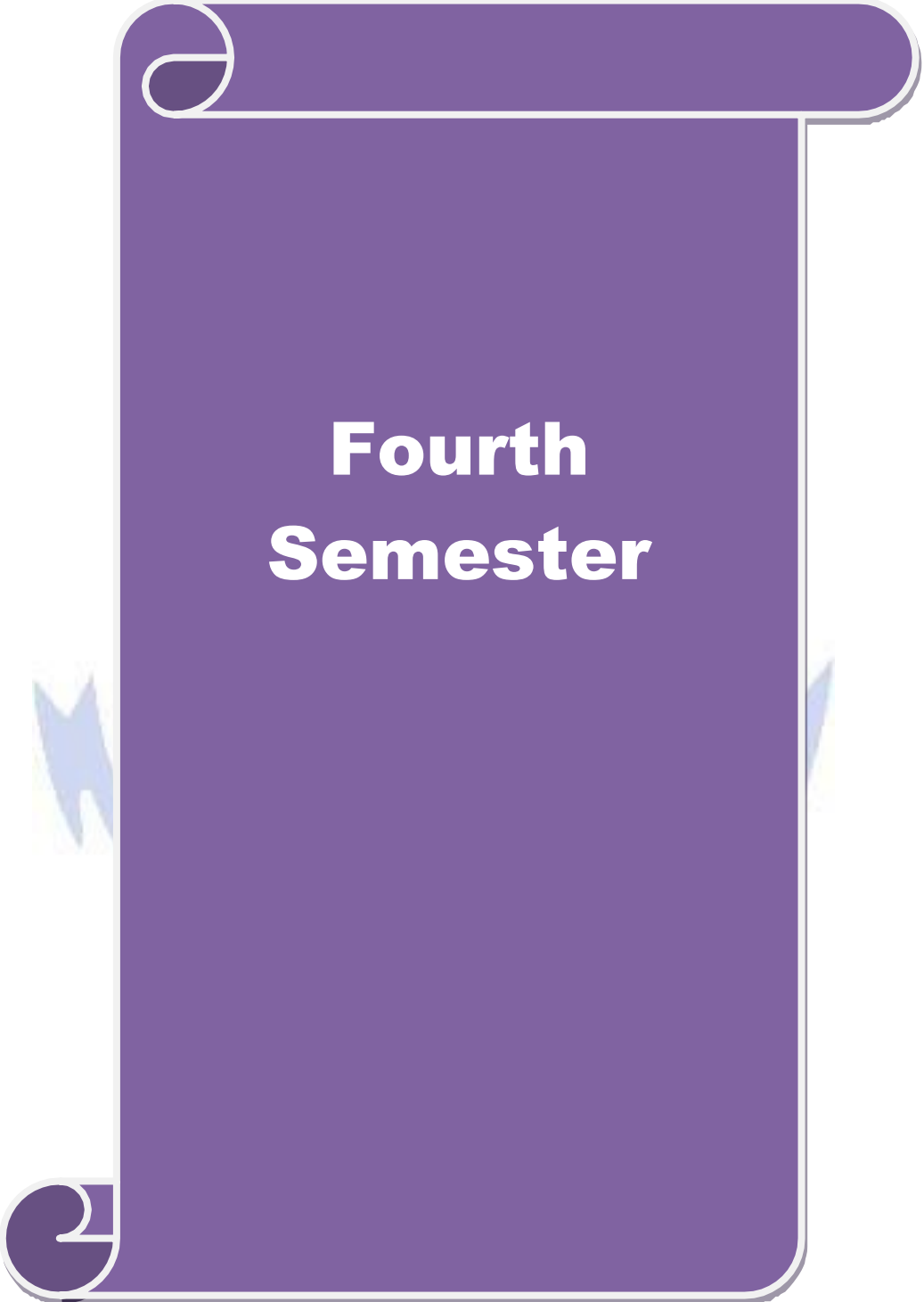
*S-Strong; M-Medium; L-Low

Coursecode		SoftwareEngineeringandSoftwareProjectManagement	L	T	P	C
Core/Elective/ Supportive		SkillbasedSubject-1	5	0	0	3
Pre-requisite		BasicknowledgeontheSoftwareDevelopmentLifeCycle.	Syllabus Version	2021-22 Onward		
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Toenhancethebasicsoftware engineeringmethodsandpractices. 2. Tolearnthetechniquesfordevelopingsoftware systems. 3. Tounderstandtheobjectorienteddesign. 4. Tounderstandsoftwaretestingapproaches						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understandthebasicconceptsofsoftwareengineering					K1
2	Applythesoftwareengineering modelsindeveloping softwareapplications					K2-K3
3	Implementtheobjectorienteddesigninvariousprojects					K4
4	Knowledgeon howto doassoftwareproject within-depth analysis.					K3
5	ToinculcateknowledgeonSoftwareengineeringconceptsinturninggivesaroad mapto design a newsoftwareproject.					K1-K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1 SOFTWAREENGINEERING 15hours						
SoftwareEngineering:ALayeredTechnology–SoftwareProcess–SoftwareProcessModels–ThePrototyping.RequirementEngineering–Softwareprototyping-Elementsofanalysismodel–Datamodeling – Functional modeling and information flow.						
Unit:2 SOFTWAREDESIGN 12hours						
SoftwaredesignandSoftwareengineering–TheDesignprocess–Designprinciples–Designconcepts – Effectivemodulardesign–SoftwareArchitecture						
Unit:3 SOFTWARETESTING 15hours						
Softwaretestingfundamentals–TestCaseDesign-Whiteboxtesting–Basispathtesting–Controlstructuretesting–Black boxtesting.Unit testing – Validationtesting – Systemtesting.						
Unit:4 SOFTWARECONFIGURATIONMANAGEMENT 15hours						
Software Configuration Management: Definitions and terminology – processes and activities.Software Quality assurance: Definitions– Quality control and Quality assurance – Organizationof Structures. Risk Management: Risk Identification – quantification - Monitoring - Mitigation.Software requirements gathering: Steps to be followed – Outputs and Quality Records - Skill setsrequired– Challenges.						
Unit:5 ESTIMATION 15hours						
Estimation: What is Estimation? – When and Why? – Three phases of Estimation – Estimationmethodology – Formal models of Size Estimation. Design and Development phases: Reusability -Technology choices – Standards – Portability -User interface issues – Testability - The Effect ofInterneton Project Management.						

Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	RogerS.Pressman:SoftwareEngineering,TataMcGraw Hill,VEdition.	
2	GopalaswamyRamesh, ManagingGlobalSoftwareProjects,TataMcGrawHill,NewDelhi,2002.	
3	ProgrammingwithJava –A Primer-E.Balagurusamy, 3rdEdition, TMH.	
ReferenceBooks		
1	TheCompleteReferenceJava2–Patrick Naughton& HebertSchildt,3 rd Edition,TMH	
2	ProgrammingwithJava– JohnR.Hubbard,2 nd Edition,TMH.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1		
2		
3		
CourseDesignedBy:		

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

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



Fourth Semester

Coursecode	SystemSoftwareandOperatingSystems	L	T	P	C
Core/Elective/ Supportive	Core:6	6	0	0	4
Pre-requisite	StudentsShouldhavethebasicknowledgeincompute r.	Syllabus Version	2021-22 Onward		
CourseObjectives:					
Themain objectives ofthis courseareto: 1. Tounderstandtheprocessing ofprogramson a computersystemto designandimplementationoflanguageprocessor. 2. Toenhancetheabilityof programgenerationthroughexpansionandgainknowledgeaboutCodeoptimization using softwaretools. 3. Studentswillgainknowledgeofbasicoperatingsystemconcepts. 4. Tohaveanin-depth understandingofprocessconcepts, deadlock andmemorymanagement. 5. Toprovideanexposuretoschedulingalgorithms,devicesandinformationmanagement.					
ExpectedCourseOutcomes:					
Onthesuccessful completionofthecourse,student willbe ableto:					
1	Knowtheprogramgenerationand programexecutionactivitiesindetail				K1
2	UnderstandtheconceptsofMacroExpansionsandGaintheknowledgeofEditing processes				K2-K3
3	Rememberthebasic conceptsofoperatingsystem				K1
4	Understandthe concepts likeinterrupts,deadlock,memorymanagementandfilemanagement				K2
5	Analyze the need for scheduling algorithms and implement different algorithmsused for representation, scheduling, and allocation in DOS and UNIX operatingsystem.				K1-K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create					
Unit:1	INTRODUCTIONTOSYSTEMSOFTWARE			12hours	
Introduction–SystemSoftwareandmachinearchitecture.LoaderandLinkers:BasicLoaderFunctions - Machine dependent loader features –Machine independent loader features - Loaderdesign options					
Unit:2	MACHINEAND COMPILER			15hours	
Machinedependentcompilerfeatures-Intermediateformoftheprogram- Machinedependentcodeoptimization-Machineindependentcompilerfeatures- Compilerdesignoptions-Division intopasses–Interpreters–p-codecompilers-Compiler-compilers.					
Unit:3	OPERATINGSYSTEM			15hours	
Whatisan Operating System?– ProcessConcepts:Definition of Process- ProcessStates-Process States Transition – Interrupt Processing – Interrupt Classes - Storage Management: RealStorage:RealStorageManagementStrategies–ContiguousversusNon- contiguousstorageallocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming–Variablepartition multiprogramming.					

Unit:4	VIRTUALSTORAGE	15hours
VirtualStorage:VirtualStorageManagementStrategies–PageReplacementStrategies–WorkingSets–DemandPaging–PageSize.ProcessorManagement:JobandProcessorScheduling:PreemptiveVsNon-preemptivescheduling–Priorities– Deadlinescheduling.		
Unit:5	DEVICEANDINFORMATIONMANAGEMENT	15hours
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.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	LelandL.Beck,SystemSoftware:An Introduction toSystemsProgramming,Pearson,ThirdEdition.	
2	H.M.Deitel,OperatingSystems,2ndEdition,Perason,2003.	
ReferenceBooks		
1	Achy8utS.Godbole, OperatingSystems, TMH,2002.	
2	JohnJ. Donovan,Systems Programming, TMH, 1991.	
3	D.M.Dhamdhere,SystemsProgrammingandOperatingSystems,2ndRevisedEdition,TMH.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1		
2		
3		
CourseDesignedBy:		

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

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

Coursecode		LinuxandShellProgramming	L	T	P	C
Core/Elective/ Supportive		Core:7	6	0	0	4
Pre-requisite	Before starting the course students should havethe basic knowledge about operating system andCprogramming.		Syllabus Version	2021-22 Onward		
CourseObjectives:						
Themain objectives ofthis courseareto:						
1. Linuxisamulti-userandmulti-taskingoperatingsystemandafterlearning theconceptsofanoperatingsystem						
2. Studentwillbeabletowritesimpleshell programmingusingLinuxutilities,pipesandfilters.						
3. Thefilesystem, processmanagement andmemorymanagementarediscussed.						
4. Variouscommandsusedby Linuxshellis alsodiscussedwhich makestheusers tointeractwitheach other.						
5. Bourneshellprogramming isdealtin depthwhichcan beused todevelopapplications.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Describethearchitectureandfeaturesof LinuxOperatingSystemanddistinguishitfromother Operating System.					K1
2	DevelopLinuxutilitiestoperformFileprocessing,Directoryhandling,UserManagement and displaysystem configuration					K2-K3
3	Developshellscriptsusingpipes,redirection,filtersandPipes					K2
4	ApplyandchangetheownershipandfilepermissionsusingadvanceUnixcomm ands.					K3
5	Build Regular expression to perform pattern matching using utilities andimplementshell scripts forreal timeapplications.					K3-K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
INTRODUCTION			12hours			
IntroductiontoLINUXOperatingSystem:Introduction-TheLINUXOperatingSystem.						
Unit:2						
MANAGINGFILESANDDIRECTORIES			15hours			
Managing Filesand Directories:Introduction– Directory Commands inLINUX–File CommandsinLINUX.						
Unit:3						
VIEDITOR			15hours			
Creatingfilesusingthevieditor:Texteditors–Thevieditor.ManagingDocuments:Locatingfilesin LINUX– Standard files– Redirection – Filters– Pipes.						
Unit:4						
SECURINGFILES			15hours			
Securing files in LINUX: File access permissions – viewing File access permissions – ChangingFile access permissions. Automating Tasks using Shell Scripts: Introduction – Variables- LocalandGlobal Shell variables– Command Substitution.						

Unit:5	CONDITIONALEXECUTIONINSHELLSCRIPTS	15hours
Using Conditional Execution in Shell Scripts: Conditional Execution – The case...esac Construct.ManagingrepetitivetaasksusingShellScripts:UsingIterationinShellScripts– Thewhileconstruct – until construct – for construct – break and continue commands – Simple ProgramsusingShell Scripts.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	OperatingSystemLINUX,NIIT,PHI,2006,EasternEconomyEdition.	
2	N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications,2008, 1st Edition	
ReferenceBooks		
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-HillPublishingCompany Limited, New Delhi, Edition2008.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1	http://spoken-tutorial.org/	
2	https://www.tutorialspoint.com/linux/index.htm	
3		
CourseDesignedBy:		

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

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

Coursecode		ProgrammingLab– LINUXandSHELLPROGRAMMING	L	T	P	C
Core/Elective/Supportive		CoreLab:5	0	0	6	4
Pre-requisite		Studentsshouldhavethepriorbasicknowledgeino perating system.	Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. DescribethearchitectureandfeaturesofLinuxOperatingSystem 2. TocreateprogramsinthelinuxenvironmentusingLinuxutilities andcommands. 3. StudentisgivenanintroductionofLinuxshellcommandsandthey willbeabletowriteownshellscripts. 4. Shell programmingisdealtin depthwhichcanbeusedtodevelopapplications.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	DevelopLinuxutilitiestoperform Fileprocessing,DirectoryhandlingandUserManagement					K1, K2
2	Understandanddevelop shellscriptsusingpipes,redirection,filters,Pipesanddisplaysystem configuration					K2-K3
3	Developsimpleshellscriptsapplicabletofileaccesspermissionnetworkadmi nistration					K3
4	ApplyandchangetheownershipandfilepermissionsusingadvanceUnixcomm ands.					K4-K5
5	Createshellscriptsforrealtimeapplications.					K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Programs						
36hours						
1. Writeashellscript tostimulatethefilecommands:rm,cp, cat,mv, cmp,wc, split,diff.						
2. Writeashell scriptto showthefollowingsystem configuration: a. currentlylogged user and hislog name b. current shell , home directory , Operating System type , current Path setting , currentworkingdirectory c. showcurrentlylogged numberofusers,show allavailableshells d. showCPUinformation likeprocessortype ,speed e. showmemoryinformation						
3. WriteaShellScript to implementthefollowing: pipes,Redirection andteecommands.						
4. Writeashellscriptfordisplayingcurrentdate,username,filelistinganddirectoriesbygettinguser choice.						
5. Writeashellscript toimplement thefilter commands.						
6. Writeashell script to removethefiles which hasfilesizeas zero bytes.						
7. Writeashell script to find thesum ofthe individual digits ofagiven number.						
8. Writeashellscripttofindthegreatestamongthegivensetofnumbersusingcommandlinearguments.						
9. Writeashell scriptforpalindromechecking.						
10. Writeashellscriptto printhemultiplicationtableofthegivenargumentusingforloop.						

		TotalLecturehours	36hours
TextBook(s)			
1	OperatingSystemLINUX,NIIT,PHI,2006,EasternEconomyEdition.		
2	N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications,2008, 1 st Edition		
ReferenceBooks			
1	RichardPetersen,Linux:TheCompleteReference,SixthEdition,TataMcGraw-HillPublishingCompany Limited, New Delhi, Edition 2008.		
RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]			
1	https://www.w3resource.com/linux-exercises/		
2	http://spoken-tutorial.org/		
3			
CourseDesignedBy:			

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

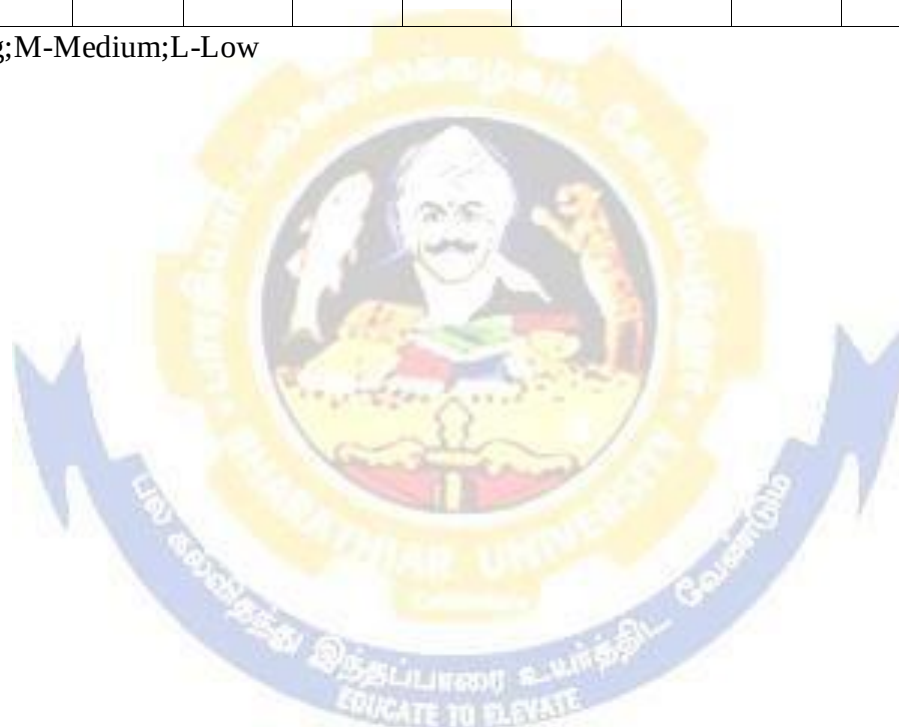
*S-Strong;M-Medium;L-Low

Coursecode		Lab–SoftwareProject Management	L	T	P	C
Core/Elective/Supportive		SkillBasedSubject2(Lab):1	0	0	4	3
Pre-requisite		Basic knowledge in SDLC and managing of software projects	Syllabus Version		2021-22 Onward	
CourseObjectives:						
The main objectives of this course are to:						
1. To gain knowledge about how to develop project plan						
2. To create requirement analysis and specification for software applications.						
3. Student is given an introduction of various phases of software development lifecycle models.						
4. To analyze the steps are to be implemented using SDLC to develop applications.						
ExpectedCourseOutcomes:						
On the successful completion of the course, student will be able to:						
1	Prepare a Project Plan with requirement analysis and specification.					K1, K2
2	Understand and develop cost estimation model for real time applications.					K2-K3
3	Implement the concept of checkpoints in design phase					K3
4	Analyze the Development phase of the database and text area of the applications.					K4-K5
5	Create SDLC for real time applications.					K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create						
Programs						
36hours						
1. Preparation of Project Management Plan.						
2. Using any of the CASE tools, Practice requirement analysis and specification for different firms.						
3. Case study of cost estimation models.						
4. Practice object oriented design principles for implementation.						
5. Practice function oriented design.						
6. Practice creating software documentation for the Analysis phase of software development lifecycle for a real time application.						
7. Practice creating software documentation for the Development phase of software development lifecycle for a real time application.						
8. Practice creating software documentation for the Implementation phase of software development lifecycle for a real time application.						
9. Practice creating software documentation for the Testing phase of software development lifecycle for a real time application.						
10. Simulate a tool for path testing principles.						
11. Simulate a tool for testing based on control structures.						
12. Simulate a tool that reflects black box testing concepts						
Total Lecture hours					36hours	
TextBook(s)						
1						
ReferenceBooks						
1						

RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	
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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	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

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





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 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Thecoursedescribesthedata,organizingthedataindatabase,database administration. 2. Tograsp thedifferent issues involvedin thedesign of adatabasesystem. 3. Tostudythephysicalandlogicaldatabasesdesignsanddatabase modelinglikere relational,Hierar chical,networkmodels, databasesecurity, integrity andnormalization. 4.ItalsogivesintroductiontoSQLlanguageto retrievethedata fromthedatabasewith suitableapplicationdevelopment. 5. Provide strong foundation of database concepts and to introduce students to applicationdevelopmentin DBMS.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understand the basic concepts of Relational Data Model, Entity- RelationshipModel and processof Normalization					K1-K2
2	UnderstandandconstructdatabaseusingStructuredQueryLanguage(SQ L)in Oracle9i environment.					K1-K3
3	LearnbasicsofPL/SQLanddevelopprogramsusingCursors,Exceptions ,Procedures and Functions.					K1-K4
4	Understand and use built-in functions and enhance the knowledge ofhandlingmultiple tables					K1-K3
5	AttainagoodpracticalskillofmanagingandretrievingofdatausingData Manipulation Language(DML)					K2-K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1	DATABASE CONCEPTS				15hours	
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.						
Unit:2	ORACLE9i				15hours	
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.						
Unit:3	WORKINGWITHTABLE				15hours	
WorkingwithTable:DataManagementandRetrieval:DML–addinganewRow/Record– CustomizedPrompts–UpdatingandDeletinganExistingRows/Records–retrievingDatafrom						

Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions – Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.		
Unit:4	PL/SQL	15hours
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.		
Unit:5	PL/SQL COMPOSITE DATA TYPES	12hours
PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views.		
Unit:6	Contemporary Issues	3hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	75hours
Text Book(s)		
1	Database Systems using Oracle, Nilesch 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 th Edition, February 2014.	
Reference Books		
1	Database Management Systems, Majumdar & Bhattacharya, 2007, TMH.	
2	Database Management Systems, Gerald V. Post, 3rd edition, TMH.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	http://www.digimat.in/nptel/courses/video/106105175/L01.html	
2	https://www.tutorialspoint.com/oracle_sql/index.htm	
Course Designed By:		

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

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

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 Onward		
Course Objectives:					
The main objectives of this course are to: 1. The main aim of the course is to cover visual basic programming skills required for modern software development. 2. To study the advantages of Controls available with visual basic. 3. To gain a basic understanding of database access and management using data controls. 4. To facilitate the learner to carry out project works using the tools available in VB and MS Access.					
Expected Course Outcomes:					
On the successful completion of the course, student will be able to:					
1	Demonstrate fundamental skills in utilizing the tools of a visual environment such as command, 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
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create					
Unit:1	INTRODUCTION TO VB	15hours			
Getting Started with VB6, Programming Environment, working with Forms, Developing an application, Variables, Data types and Modules, procedures and control structures, arrays. Working with Controls: Creating and using controls, working with control arrays.					
Unit:2	MENUS IN VB	15hours			
Menus, Mouse events and Dialog boxes: Mouse events, Dialog boxes, MDI and Flexgrid: MDI, Using the Flex grid control.					
Unit:3	ODBC AND DATA ACCESS OBJECTS	15hours			
ODBC and Data Access Objects: Data Access Options, ODBC, Remote data objects, ActiveX EXE and ActiveX DLL: Introduction, Creating an ActiveX EXE Component, Creating ActiveX DLL Component.					
Unit:4	OBJECT LINKING AND EMBEDDING	15hours			
Object Linking and Embedding: OLE fundamentals, Using OLE Container Control, Using OLE Automation objects, OLE Drag and Drop, File and File System Control: File System Controls, Accessing Files.					
Unit:5	CONTROLS IN VB	12hours			
Additional controls in VB: scrollbar, setting properties at runtime, adding control to tab, list control, tab strip control, MS Flexgrid control, Why ADO, Establishing a reference, Crystal and					

Datareports.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. (Unit I to Unit IV)	
2	ProgrammingwithVisualBasic6.0,MohammedAzam,VikasPublishingHouse,FourthReprint,2006. (Unit V)	
ReferenceBooks		
1	GrayCornell(2003),”VisualBasic6fromgroundup” TMH,New Delhi,1stEdition,	
2	DeitelandDeitel,T.R.Nieto(1998),“VisualBasic6 - HowtoProgram”,PearsonEducation.FirstEdition.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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CourseDesignedBy:		

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

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

Coursecode		Programming Lab – VB& Oracle	L	T	P	C
Core/Elective/Supportive		CoreLab :6	0	0	6	4
Pre-requisite		Studentsshouldhavethetheoreticalknowledgein visual basicand oops concept.	Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. TodevelopapplicationsusingGraphicalUser Interfacetools. 2. Tounderstandthedesignconcepts. 3. Todesignandbulddatabasesystemsanddemonstratetheir competence. 4. Tocreaterequirementanalysisand specificationforsoftwareapplications.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understandthe conceptsofVisualBasic.					K1
2	LearntheadvantagesofControlsinVB					K2
3	Designanddeveloptheevent-drivenapplicationsusingVisualBasicframework.					K3
4	Applytheknowledgeof databasemethods.					K4
5	LearnbasicsofPL/SQLanddevelopprogramsusingCursors,Exceptions,Proce duresand Functions					K6
K1–Remember;K2 –Understand; K3 –Apply;K4– Analyze;K5– Evaluate; K6–Create						
Programs			36hours			
1.ConstructionofanArithmeticCalculator(Simple).						
2. Writingsimpleprogramsusingloopsanddecision-makingstatements. a. GenerateFibonacciseries. b. Findthesum ofNnumbers.						
3.Writeaprogram to createamenu and MDIForms.						
4.Writeaprogramtodisplayfiles inadirectoryusingDriveListBox,DirListBoxandFileListBoxcontrol andopen,edit and savetextfileusing Rich textbox control.						
5.Writeaprogram toillustrate CommonDialog Controlandto open,edit andsavetextfile.						
6.Writeaprogramtoimplement animationusingtimers.						
7. Writeasimple VBprogramto acceptanumberasinputand convertitinto a.Binaryb.Octal c.Hexa-decimal						
8. Create a table for Employee details with Employee Number as primary key and followingfields: Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows andperform various queries using any one Comparison, Logical, Set, Sorting and Groupingoperators.						
9. Write a PL/SQL to update the rate field by 20% more than thecurrent rate in inventorytable which has the following fields: Prono, ProName and Rate. After updating the table anew field (Alter) called for Number of item and place for values for the new field withoutusing PL/SQLblock.						
10.WriteaPL/SQLprogram toimplement theconceptof 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.		
	Total Lecture hours	36 hours
Text Book(s)		
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8 th reprint, 2007. (Unit I to Unit IV)	
2	Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006. (Unit V)	
3	E-Book: Bill Pribyl, Steven Feuerstein, “Oracle PL/SQL Programming”, O’Reilly Media, Inc., 6 th Edition, February 2014.	
Reference Books		
1	Gray Cornell (2003), ”Visual Basic 6 from ground up” TMH, New Delhi, 1 st Edition,	
2	Deitel and Deitel, T.R. Nieto (1998), “Visual Basic 6 – How to Program”, Pearson Education. First Edition.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1		
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Course Designed By:		

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

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

Coursecode		PYTHONProgramming	L	T	P	C
Core/Elective/ Supportive		Elective:I	6	0	0	4
Pre-requisite	Knowledgeonlogicoftheprogramsandloopsconcept.		Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Tointroducethe fundamentalsof PythonProgramming. 2. Toteachabout the conceptof FunctionsinPython. 3. ToimparttheknowledgeofLists,Tuples,FilesandDirectories. 4. Tolearnaboutdictionariesinpython. 5. Toexplorestheobject-orientedprogramming,Graphicalprogramming aspectsofpythonwithhelp ofbuilt in modules..						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthe course,studentwill beableto:						
1	Rememberingtheconceptofoperators,datatypes,loopingstatementsinPython programming.					K1
2	UnderstandingtheconceptsofInput/ Outputoperationsinfile..					K2
3	Applyingtheconceptof functionsandexceptionhandling					K3
4	Analyzingthestructuresoflist,tuplesandmaintainingdictionaries					K4
5	Demonstratesignificant experiencewithpythonprogramdevelopmentenvironment					K4-K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
BASICSOF PYTHON			10hours			
BASICS : Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators - LogicalOperators -Bit Wise Operators-Simple Input andOutput.						
Unit:2						
CONTROLSTATEMENTS			10hours			
CONTROL STATEMENTS: Control Flow and Syntax - Indenting - if Statement - statements andexpressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop.LISTS:List-listslices-listmethods-listloop–mutability–aliasing-cloninglists-listparameters.TUPLES: Tupleassignment, tupleasreturn value-Sets– Dictionaries						
Unit:3						
FUNCTIONS			10hours			
FUNCTIONS: Definition - Passing parameters to a Function - Built-in functions- Variable NumberofArguments-Scope–Typeconversion-Typecoercion-PassingFunctionsto aFunction- Mapping Functions in a Dictionary – Lambda - Modules - Standard Modules – sys – math – time - dir -help Function.						
Unit:4						
ERRORHANDLING			12hours			
ERROR HANDLING: Run Time Errors - Exception Model - Exception Hierarchy - HandlingMultipleExceptions-DataStreams-AccessModesWriting-DatatoaFileReading-DataFroma File - Additional File Methods - Using Pipes as Data Streams - Handling IO Exceptions - Workingwith Directories.						

Unit:5	OBJECTORIENTEDFEATURES	12hours
OBJECT ORIENTED FEATURES: Classes Principles of Object Orientation - Creating Classes - InstanceMethods-FileOrganization-SpecialMethods-ClassVariables-Inheritance-Polymorphism - Type Identification - Simple Character Matches - Special Characters - CharacterClasses – Quantifiers - Dot Character - Greedy Matches – Grouping - Matching at Beginning orEnd-MatchObjects –Substituting-Splitting aString -CompilingRegular Expressions.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	55hours
TextBook(s)		
1	MarkSummerfield,Programmingin Python3:AComplete introductiontothePythonLanguage,Addison-Wesley Professional, 2009.	
2	MartinC.Brown, PYTHON:TheCompleteReference,McGraw-Hill, 2001	
3	E. Balagurusamy (2017), “Problem Solving and Python Programming”, McGraw-Hill, FirstEdition.	
ReferenceBooks		
1	AllenB.Downey,“ThinkPython:HowtoThinkLikeaComputerScientist”,2ndedition,Updatedfor Python 3, Shroff/O’ReillyPublishers, 2016	
2	Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated forPython3.2, NetworkTheory Ltd., 2011	
3	WesleyJChun,CorePythonApplicationsProgrammingI,PrenticeHall,2012.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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CourseDesignedBy:		

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

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

Coursecode		ComputerNetworks	L	T	P	C
Core/Elective/ Supportive		Elective:I	6	0	0	4
Pre-requisite	Studentsshouldhavetheknowledge oncomputerconnectivityand connectivityperipherals.		Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto:						
1. To identify various components in a data communication system and understand state-of-the-artin networkprotocols, architectures and applications.						
2. Toenablestudentsthroughtheconceptsofcomputernetworks,differentmodelsand theirinvolvementin each stageof networkcommunication.						
3. To educate the concepts of terminology and concepts of the OSI reference model and theTCP/IPPreferencemodelandprotocols such as TCP,UDP and IP.						
4. Tobefamiliarwiththeconceptsofprotocols,networkinterfaces, anddesign/performanceissuesin local areanetworks and wideareanetworks.						
5. Introducethestudenttoanetworkroutingfor IP networksandhow acollisionoccursandhowto solveitand how aframeis created andcharactercount ofeach frame.						
ExpectedCourseOutcomes:						
Onthesuccessfulcompletion ofthe course, studentwill beable to:						
1	Remember the organization of computer networks, factors influencing computernetworkdevelopmentandthereasonsforhavingvarietyofdifferenttypesofnet works.					K1
2	UnderstandInternetstructureandcanseehowstandardproblemsaresolvedand theuseofcryptography andnetworksecurity.					K2
3	Applyknowledgeofdifferenttechniquesofferrordetectionandcorrectiontodetect andsolveerrorbit duringdatatransmission.					K3
4	Analyze the requirements for a given organizational structure and select the mostappropriatenetworkingarchitectureand technologies					K4
5	Knowledge about different computer networks, reference models and the functionsofeach layer in themodels					K2-K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
BASICSOFNETWORKS ANDOSIMODEL			15hours			
Network Hardware: LAN – WAN – MAN – Wireless – Home Networks. Network Software:Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionlesservices – Service Primitives – The Relationship of services to Protocols. Reference Models: OSISreferenceModel–TCP/IPreferenceModel–ComparisonofOSIandTCP/IP– CritiqueofOSI andprotocols– CritiqueoftheTCP/IPReferencemodel.						
Unit:2						
PHYSICALLAYER			15hours			
PHYSICAL LAYER - Guided Transmission Media: Magnetic Media – Twisted Pair – CoaxialCable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission –MicrowaveTransmission–InfraredandMillimeterWaves– LightWaves.CommunicationSatellites:Geostationary,Medium-EarthOrbit,LowEarth- orbitSatellites– SatellitesversusFiber.						

Unit:3		DATA-LINKLAYER	15hours
DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – SlidingWindow Protocols. MEDIUM-ACCESS CONTROL SUB LAYER: Multiple Access Protocols –Ethernet –Wireless LANs-Broadband Wireless –Bluetooth.			
Unit:4		NETWORKLAYER	15hours
NETWORKLAYER:Routingalgorithms– CongestionControlAlgorithms.TRANSPORTLAYER:Elements ofTransport Protocols–Internet Transport Protocols:TCP.			
Unit:5		APPLICATIONLAYER	12hours
APPLICATIONLAYER:DNS–E-mail.NETWORKSECURITY:Cryptography– SymmetricKeyAlgorithms– PublicKey Algorithms– Digital Signatures.			
Unit:6		ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars			
		TotalLecturehours	75hours
TextBook(s)			
1	ComputerNetworks,AndrewS.Tanenbaum,4thedition,PHI. (UNIT-I:1.2-1.4UNIT-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)		
ReferenceBooks			
1	DataCommunicationandNetworks,AchyutGodbole,2007,TMH.		
2	ComputerNetworks:Protocols,Standards,andInterfaces,UylessBlack,2nded,PHI		
3			
RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]			
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CourseDesignedBy:			

Mapping with Programme Outcomes										
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		OrganizationalBehaviour	L	T	P	C
Core/Elective/ Supportive		Elective:I	6	0	0	4
Pre-requisite		Basicknowledgeinhumanbehaviorskills	Syllabus		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Tohelpthestudentsto developcognizanceof theimportanceofhumanbehaviour. 2. Toenablestudentstodescribewhatpeoplebehaveunderdifferentconditionsandunderstandwhypeople behaveas they do. 3. Toprovidethestudentstoanalysesspecificstrategichumanresourcesdemandsforfutureaction. 4. Toenablestudentstosynthesizerelatedinformationandevaluateoptionsforthemostlogical andoptimalsolutionsuchthattheywouldbeabletopredictandcontrolhumanbehaviourandimproveresults.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Demonstratetheapplicabilityoftheconceptoforganizationalbehaviortounderstandthe behaviorof people in the organization.					K1
2	DevelopManagerialskillsforIndividual Behaviors.					K2
3	Analyzeethecomplexitiesassociatedwithmanagementofthegroupbehaviorintheorganiz ation.Analyzehow to managethe Stress during ajob.					K3
4	DevelopanOrganizationalBehaviourmodelforanytypeofOrganization.					K3
5	AnalyzeetheCommonbiasesanderadicationinDecisionMakingProcess.					K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1		INTRODUCTION			15hours	
IntroductiontoOrganizationalBehavior–RelatedDisciplines–TheoreticalFramework– OrganizationalApproaches– ModernOrganizationalScenario:Impactof Globalization						
Unit:2		INDIVIDUALBEHAVIOR			15hours	
IndividualBehavior–Perception–Process–Changes–PersonalityandAttitudes–JobSatisfaction						
Unit:3		MOTIVATION			15hours	
Motivation:Needs,ContentandProcess:Motivation:ContentTheories-ghh–ProcessTheories– ContemporaryTheories–MotivationApplied–JobDesignandGoalsetting.Leadership–Background– Process–Styles– Activities – Skills						
Unit:4		GROUP			15hours	
Group Dynamics – The nature of Informal Organizations – Formal Groups – Interactive conflict:Interpersonal conflict – Inter-group behavior and conflict – Negotiation Skills: Going beyondconflictmanagement –TraditionalNegotiationApproaches-Contemporarynegotiation skills.						

Unit:5	COMMUNICATION	12hours
Communication–Roleandbackground–Interpersonalcommunication–Informalcommunication–TheDecisionMakingprocess–ParticipativeDecisionmakingtechniques–Organizationdesign–culture–Organizationchangeand development		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	FredLuthans,OrganizationalBehavior,9th Edition,McGraw HillIrwin,2002.	
2	JohnW.NewstormandKeithDavis,OrganizationalBehavior,10thEdition.	
ReferenceBooks		
1	Robbins,S.P.,&Judge, T.(2013). Organizationalbehavior (15thed.). Boston:Pearson.	
2	NewstromJ.W.,&Davis,K.(2011).Humanbehavior atwork(12thed.). TataMcGrawHill	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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CourseDesignedBy:		

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

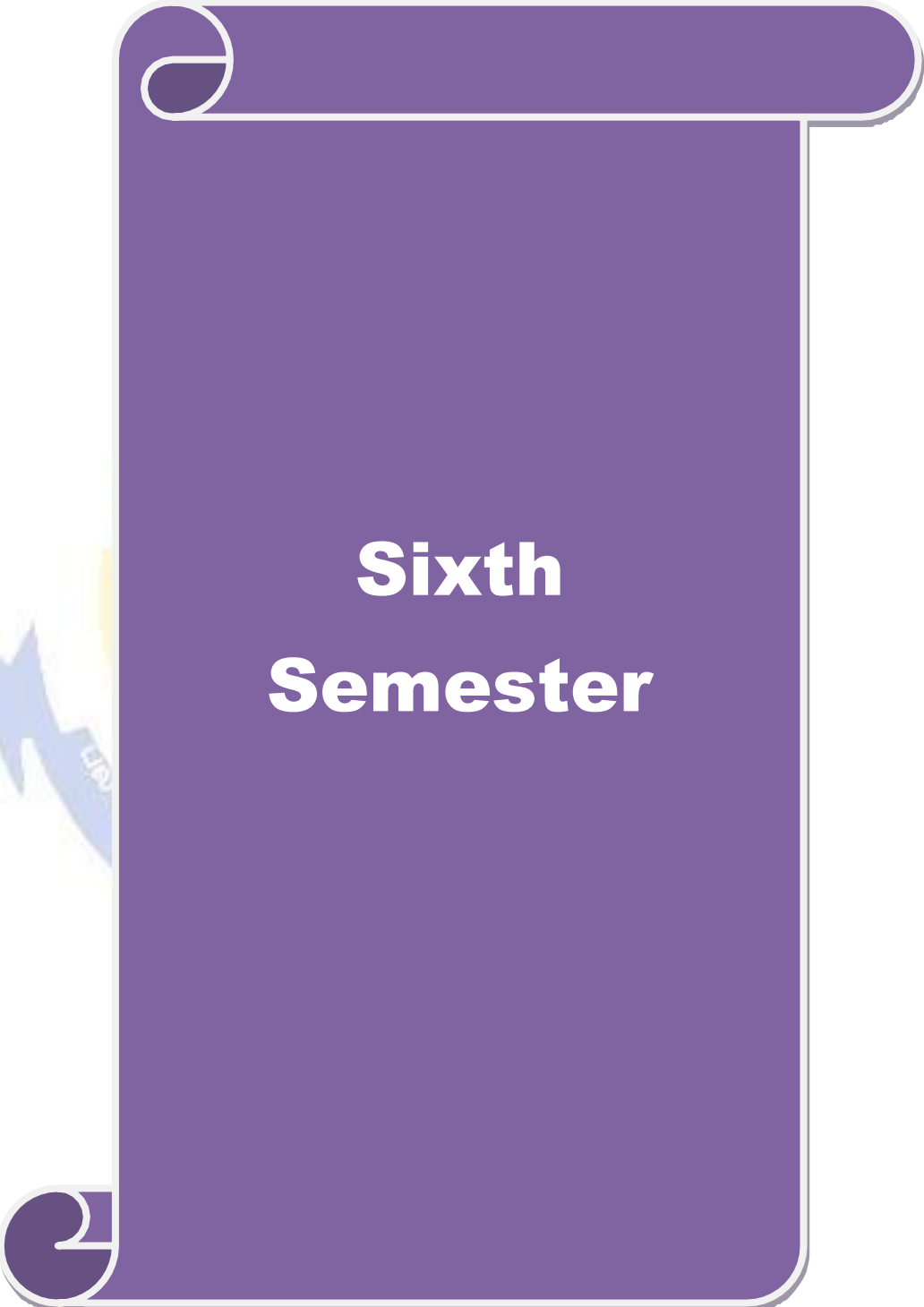
*S-Strong;M-Medium;L-Low

Coursecode		SoftwareTesting	L	T	P	C
Core/Elective/ Supportive		SkillbasedSubject:3	6	0	0	3
Pre-requisite	Basicknowledgein softwareproject andSDLC		Syllabus		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto:						
1. Tostudy fundamentalconcepts insoftwaretesting						
2. Todiscussvarioussoftwaretestingissuesand solutionsinsoftwareunittest,integrationandsystem testing.						
3. To expose the advanced software testing topics, such as object-oriented software testingmethods.						
4. Listarangeofdifferent softwaretestingtechniques andstrategiesandbeabletoapplyspecificautomated unit testing method to the projects.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Explainthebasicconceptsand theprocessesthatlead tosoftwaretesting					K2
2	DesigntestcasesfromthegivenrequirementsusingBlackboxtestingtechniques					K3
3	Identifythetest casesfrom Sourcecodebymeansof whitebox testingtechniques					K3
4	Knowaboutuser acceptancetestingandgenerate testcasesforit					K4
5	Examinethe testadequacy criteriato completethetestingprocess					K4
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1 SOFTWAREDEVELOPMENTLIFECYCLEMODELS 15hours						
SoftwareDevelopmentLifeCyclemodels:PhasesofSoftwareproject–Quality,Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to representDifferent Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing –Challengesin White-BoxTesting.						
Unit:2 BLACK-BOXTESTING 15hours						
Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? – Challenges in White Box Testing - IntegrationTesting: Integration Testing as Type of Testing – Integration Testing as a Phase f Testing–ScenarioTesting– Defect Bash.						
Unit:3 SYSTEMANDACCEPTANCETESTING 15hours						
System and AcceptanceTesting: system Testing Overview – Why System testing is done? – FunctionalversusNon-functionalTesting-Functionaltesting-Non-functionalTesting– AcceptanceTesting– Summary ofTesting Phases.						
Unit:4 PERFORMANCETESTING 15hours						
FactorsgoverningPerformanceTesting–MethodologyofPerformanceTesting–toolsforPerformance Testing – Process for Performance Testing – Challenges. Regression Testing: What isRegression Testing? – Types of Regression Testing – When to do Regression Testing – How to doRegressionTesting– Best Practices inRegressionTesting.						

Unit:5	TEST PLANNING, MANAGEMENT, EXECUTION AND REPORTING	12hours
Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting – Best Practices. Test Metrics and Measurements: Project Metrics– Progress Metrics– Productivity Metrics– Release Metrics.		
Unit:6	Contemporary Issues	3hours
Expert lectures, online seminars -webinars		
	Total Lecture hours	75hours
Text Book(s)		
1	Software Testing Principles and Practices, Srinivasan Desikan & Gopalswamy Ramesh, 2006, Pearson Education. (UNIT-I: 2.1-2.5, 3.1-3.4 UNIT-II: 4.1-4.4, 5.1-5.5 UNIT-III: 6.1-6.7 (UNIT-IV: 7.1-7.6, 8.1-8.5 UNIT-V: 15.1-15.6, 17.4-17.7)	
2	Limaye M.G., “Software Testing Principles, Techniques and Tools”, Second Reprint, TMH Publishers, 2010.	
3	Aditya P. Mathur, “Foundation of Software Testing”, 2nd Edition, Pearson Education, 2013.	
Reference Books		
1	Effective Methods of Software Testing, William E. Perry, 3rd ed, Wiley India.	
2	Software Testing, Renu Rajani, Pradeep Oak, 2007, TMH.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
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Course Designed By:		

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

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



Sixth Semester

Coursecode		Graphics&Multimedia	L	T	P	C
Core/Elective/ Supportive		Core:10	5	0	0	4
Pre-requisite	Basicknowledgein2D,3Dandmultimediafileformats		Syllabus Version	2021-22 Onward		
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Designandapplytwo dimensionalgraphicsandtransformations. 2. Designandapplythreedimensionalgraphicsandtransformations. 3. ApplyIllumination,colormodelsandclippingtechniquetographics. 4. UnderstoodDifferenttypesofMultimediaFileFormat.						
ExpectedCourseOutcomes:						
Onthesuccessfulcompletion of thecourse, studentwill beable to:						
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	CreatesAnimationwithspecialeffectsusingalgorithms					K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
OUTPUTPRIMITIVES			15hours			
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.						
Unit:2						
2DGEOMETRICTRANSFORMATIONS			15hours			
2D Geometric Transformations: Basic Transformations– Matrix Representations – CompositeTransformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Co-ordinateReferenceFrame–Window-to-ViewportCo-ordinateTransformation-2DViewing Functions–ClippingOperations.						
Unit:3						
TEXT			15hours			
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.						

Unit:4		AUDIO	15hours
Audio:Introduction –Acoustics –NatureofSound Waves –FundamentalCharacteristics ofSound – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response - AudioProcessingSoftware.			
Unit:5		VIDEOANDANIMATION	12hours
Video:AnalogVideoCamera–TransmissionofVideoSignals–VideoSignalFormats–Television Broadcasting Standards – PC Video –Video File Formats and CODECs– VideoEditing– VideoEditingSoftware.Animation:TypesofAnimation–ComputerAssistedAnimation– CreatingMovement–PrinciplesofAnimation–SomeTechniquesofAnimation– Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio – MPEG-1Video -MPEG-2Audio – MPEG-2 Video.			
Unit:6		ContemporaryIssues	3hours
Expertlectures,onlineseminars -webinars			
		TotalLecturehours	75hours
TextBook(s)			
1	ComputerGraphics,DonaldHearn,M.PaulineBaker,2ndedition,PHI. (UNIT -I:3.1-3.6,4.1-4.5& UNIT-II: 5.1-5.4,6.1-6.5)		
2	PrinciplesofMultimedia,RanjanParekh,2007,TMH. (UNITIII:4.1-4.7,5.1-5.16UNIT-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)		
ReferenceBooks			
1	ComputerGraphics,AmarendraNSinha,ArunD Udai,TMH.		
2	Multimedia:MakingitWork,Tay Vaughan,7thedition,TMH.		
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]			
1			
CourseDesignedBy:			

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

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

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 Onward	
Course Objectives:						
The main objectives of this course are to: 1. To understand and select the task based on their core skills. 2. To get the knowledge about analytical skill for solving the selected task. 3. To get confidence for implementing the task and solving the real time problems. 4. Express technical and behavioral ideas and thought in oral settings. 5. Prepare and conduct oral presentations						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Formulate a real world problem and develop its requirements develop a design solution for a set of requirements.					K3
2	Test and validate the conformance of the developed prototype against the original requirements of the problem.					K5
3	Work as a responsible member and possibly a leader of a team in developing software solutions.					K3
4	Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of the project.					K1-K4
5	Generate alternative solutions, compare them and select the optimum one.					K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
AIM OF THE PROJECT WORK						
1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied. 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. 3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.						
Viva Voce						
1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 150 marks at the last day of the practical session. 2. Out of 150 marks, 60 marks for CIA and 90 for CEE (60 evaluation of project report + 30 Viva Voce).						

ProjectReportFormat	
PROJECTWORK TITLE OF THE DISSERTATION Bonafide Work Done by TUDENT NAMEREG.NO. Dissertationsubmittedin partialfulfillmentofthe requirementsfor theawardof <NameoftheDegree> ofBharathiarUniversity,Coimbatore-46. Signature of the Guide College Logo  Signature of the HOD Submitted for the Viva-Voce Examination held on _____ Internal Examiner External Examiner Month–Year	
CONTENTS Acknowledgement Contents Synopsis 1. Introduction 1.1 Organization Profile 1.2 System Specification 1.2.1 Hardware Configuration 1.2.2 Software Specification 2. System Study 2.1 Existing System 2.1.1 Drawbacks	

2.2 ProposedSystem

2.2.1 Features

3. SystemDesignandDevelopment

3.1 FileDesign

3.2 InputDesign

3.3 OutputDesign

3.4 DatabaseDesign

3.5 SystemDevelopment

3.5.1 Descriptionof Modules(Detailedexplanationabouttheprojectwork)

4. TestingandImplementation

5. Conclusion

Bibliography

Appendices

A. Data FlowDiagram

B. TableStructure

C. SampleCoding

D. SampleInput

E. SampleOutput

CourseDesignedBy:

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

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

Coursecode		ProgrammingLab– Graphics&Multimedia	L	T	P	C
Core/Elective/Supportive		CoreLab :7	0	0	5	4
Pre-requisite		StudentsshouldhavethebasicknowledgeonCand C++to do computer graphics andmultimediaapplications.	Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Tolearnthebasicprinciplesof2-dimensionalcomputer graphics. 2. Provideanunderstandingofhowtoscanconvertthebasicgeometricalprimitives,howtotransformtheshapes to fit them as per thepicturedefinition. 3. Provideanunderstandingofmappingfromaworldcoordinatestodevicecoordinates,clippingandprojections. 4. Tobeable todiscuss theapplicationofcomputergraphics conceptsin thedevelopmentofcomputergames, information visualization andbusiness applications. 5. Tocomprehendandanalysethefundamentalsofanimation,virtualreality,underlying technologies,principlesandapplications.						
ExpectedCourseOutcomes:						
Onthesuccessfulcompletion ofthe course, studentwill beable to:						
1	Understandthebasicconceptsofcomputergraphics.					K1
2	DesignscanconversionproblemsusingCandC++programming.					K2
3	Applyclippingandfillingtechniques formodifyinganobject.					K3
4	Understandthe concepts ofdifferenttypeofgeometrictransformationofobjectsin 2D.					K4
5	Understand and develop the practical implementation of modeling, rendering,viewingof objects in 2D					K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Programs						
Graphics						
1.Writeaprogramto rotate animage.						
2.Writeaprogram todropeach wordofasentence oneby onefrom thetop.						
3. Writeaprogram to dropalineusing DDAAalgorithm.						
4.Writeaprogramto move acar with soundeffect.						
5. Writeaprogram to bounceaball and moveit with sound effect.						
6.Writeaprogram to testwhetheragiven pixel isinsideor outsideor onapolygon.						
Multimedia						
7.CreateSun FlowerusingPhotoshop.						
8.AnimatePlaneFlying in the Clouds using Photoshop.						
9.CreatePlasticSurgery for theNoseusingPhotoshop.						
10.CreateSee-through textusingPhotoshop.						
11.Createa WebPageusingPhotoshop.						
12.ConvertBlackandWhite PhototoColorPhotousingPhotoshop.						
TotalLecturehours			36hours			

TextBook(s)	
1	ComputerGraphics,DonaldHearn,M.PaulineBaker, 2 nd edition,PHI.
2	PrinciplesofMultimedia,RanjanParekh,2007,TMH.
ReferenceBooks	
1	ComputerGraphics,AmarendraNSinha,ArunD Udai,TMH.
2	Multimedia:MakingitWork,Tay Vaughan,7 th edition,TMH.
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
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CourseDesignedBy:	

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

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

Coursecode	NetworkSecurityandCryptography	L	T	P	C
Core/Elective/ Supportive	Elective:II	5	0	0	4
Pre-requisite	Basic knowledge on security threats in networking	Syllabus Version		2021-22 Onward	
CourseObjectives:					
Themain objectives ofthis courseareto: 1. Tolearn theneed fornetworksecurityand securityapproaches. 2. Toinculcatethe conceptoftransferringauthenticdataalongthenetwork withseveralmethodsand algorithms. 3. Toenrichtheknowledgeondifferenttypesof InternetSecurity Protocols.					
ExpectedCourseOutcomes:					
Onthesuccessful completionofthecourse,student willbe ableto:					
1	RememberthebasicconceptofCryptographyandvarious typesofattacks.				K1
2	Understandaboutvarioustypesofprotocolsfor InternetSecurity.				K2
3	ImplementvariousalgorithmsforCryptography				K3
4	ReviewFirewalland IPsecurity				K4
5	Tobefamiliarwithnetworksecuritythreatsandcountermeasure				K3-K5
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate;K6 -Create					
Unit:1	SERVICEMECHANISM			15hours	
Servicemechanismandattacks–TheOSIsecurityarchitecture– Amodelfornetworksecurity– symmetricCiphermodel–Substitutiontechniques–transpositiontechniques–simplifieddes– blockchipperprinciples – thestrength ofdes–block chipperdesign principlesandmodes ofoperation.					
Unit:2	TYPESOFDES			12hours	
Tripledес-blowfish–RCSAdvancedSymmetricBlockCiphers– RC4streamCipherconfidentiallyusingsymmetricencryption–introductionto numbertheory –public– keycryptographyandRSA.					
Unit:3	KEYMANAGEMENT			15hours	
Keymanagement–DiffleHellmankeyexchange–messageauthenticationandhashfunction–hashalgorithm – digital signatureandauthentication protocols– digitalsignaturestandard.					
Unit:4	AUTHENTICATION			15hours	
Authenticationapplication–prettygoodprivacy–S/MIME–ipsecurity–websecurityconsiderations – seuresocket layertransport layer security–secureelectronictransaction.					
Unit:5	INTRUDERS			15hours	
Intruders–intrusiondetection–passwordmanagement–virusesandrelatedthreats–viruscountermeasures – firewall design principles– trusted systems					
Unit:6	ContemporaryIssues			3hours	
Expertlectures,onlineseminars –webinars					
TotalLecturehours				75hours	

TextBook(s)	
1	William Stallings, Cryptography and Network Security Principles and Practices, Fourth edition, PHI Education Asia
Reference Books	
1	Atul Kahate, Cryptography and Network Security, 2nd Edition, TMH.
2	Behrouz A. Forouzan, Cryptography and Network Security, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

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

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

Coursecode		ArtificialIntelligenceandExpertSystems	L	T	P	C
Core/Elective/ Supportive		Elective:II	5	0	0	4
Pre-requisite		Basicknowledgeonknowledgerepresentation,reasoningand problemsolvingskills	Syllabus Version	2021-22 Onward		
CourseObjectives:						
Themain objectives ofthis courseareto: 1. TounderstandthebasicconceptsofArtificialIntelligenceandidentifytheAIproblemsanddomains. 2. Toprovide searchtechniques tosolve theproblems. 3. Torepresentandaccess thedomainspecificknowledge. 4. Abilitytoapplyknowledgerepresentation,reasoning,andmachinelearningtechniquestoreal-worldproblems						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understandthenatureof AIproblemsand taskdomains of AI.					K1
2	Applytheappropriatesearchprocedures tosolve theproblemsbyusingbestalgorithms.					K2
3	Analyzeandselectthesuitableknowledgerepresentationmethod.					K3
4	Manipulatetheacquiredknowledgeandinfernew knowledge.					K4
5	DemonstratethedevelopmentofAISystems by encodingtheknowledge.					K5
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
INTRODUCTION			15hours			
Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces,Search: State space search – Production Systems – Problem Characteristics – Issues in design ofSearch.						
Unit:2						
HEURISTICSEARCHTECHNIQUES			12hours			
HeuristicSearchtechniques:GenerateandTest–HillClimbing–Best-Fist,ProblemReduction,ConstraintSatisfaction, Means-endanalysis.						
Unit:3						
KNOWLEDGEREPRESENTATION			15hours			
Knowledgerepresentationissues:Representationsandmappings–ApproachestoKnowledgerepresentations –Issues in Knowledgerepresentations– Frame Problem.						
Unit:4						
PREDICATELOGIC			15hours			
UsingPredicateLogic:Representingsimplefactsinlogic–RepresentingInstanceandIsarelationshi ps – Computablefunctions and predicates – Resolution – Natural deduction.						
Unit:5						
REPRESENTINGKNOWLEDGEUSINGRULES			15hours			
Representingknowledgeusingrules:ProceduralVsDeclarativeknowledge–Logicprogramming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of ExpertSystems-Definition-Characteristics-architecture-KnowledgeEngineering-ExpertSystemLifeCycle-KnowledgeAcquisition Strategies-ExpertSystem Tools.						

Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars –webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	Artificial Intelligence,ElaineRichandKelvinKnight,TMH,2ndEdn,1991	
2	Artificial Intelligence A Modern Approach, Stuart Russell & Peter Norvig, 2nd EditionPerason.	
ReferenceBooks		
1	Artificial Intelligence,GeorgeFLuger,4thEdition,Pearson,2002.	
2	FoundationsofArtificialIntelligentand ExpertSystems, VSJanakiRaman,KSarukesi,PGopalakrishnan,MacMillan Indialimited.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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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	L	S	L	L	L	S	S
CO3	S	S	S	L	S	L	L	L	S	S
CO4	S	S	S	L	S	L	L	L	S	S
CO5	S	S	S	L	S	L	L	L	S	S

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

Coursecode	WebTechnology	L	T	P	C
Core/Elective/ Supportive	Elective:II	5	0	0	4
Pre-requisite	Basicknowledgeinwebserver,browserandwebapplic ation	Syllabus Version		2021-22 Onward	
CourseObjectives:					
Themain objectives ofthis courseareto: 1.Oncompletionofthiscourse,astudentwillbefamiliarwithclientserver architectureandableto develop aweb applicationusing javatechnologies. 1.Students will gain the skills and project-based experienceneeded for entry into webapplicationand development careers 3. Understandbesttechnologiesforsolvingwebclient/serverproblems 4. UseJavascriptfordynamiceffects and tovalidate forminput entry 5. AnalyzetoUseappropriateclient-sideor Server-sideapplications					
ExpectedCourseOutcomes:					
Onthesuccessful completionofthecourse,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
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 –Create					
Unit:1					
TCP/IP		15hours			
TCP/IP: TCP/IP Basics – Why IP address – Logical Address - TCP/IP Example- The concept of IPaddress – Basics of TCP – Features of TCP – Relationship between TCP and IP– Ports andSockets – Active Open and Passive Open - TCP Connections – What makes TCP reliable? – TCPPacketformat -Persistent TCPconnections –UDP – DifferencesbetweenTCP and UDP.					
Unit:2					
DNS		12hours			
DNS–E-mail–FTP–TFTP–HistoryofWWW–BasicsofWWWandBrowsing-Local informationontheinternet–HTML–WebBrowserArchitecture–WebPagesandMultimedia– RemoteLogin(TELNET).					
Unit:3					
INTRODUCTIONTOWEBTECHNOLOGY		15hours			
IntroductiontoWebTechnology:Webpages–Tiers–ConceptofaTier–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.					

Unit:4	ACTIVEWEBPAGES	15hours
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.		
Unit:5	XML	15hours
XML:SGML–BasicsofXML–XMLParsers–Needforastandard.WAP:LimitationsofMobile devices – Emergence of WAP – WAP Architecture – WAP Stack – Concerns about WAPandits future– Alternatives to WAP.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars –webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	Web Technologies: TCP/IP to Internet Applications Architectures – Achyut S Godbole&AtulKahate,2007,TMH. (UNIT-I:3.1-3.5,4.1-4.12UNIT-II:5.1-5.4,6.1-6.7UNITIII:8.1-8.1,9.1-9.13UNIT IV:10.1-10.7,15.1-15.3,16.1-16.8 UNIT-V:17.1-17.4,18.1-18.6)	
ReferenceBooks		
1	Internetand WebTechnologies,Rajkamal,TMH.	
2	TCP/IPProtocolSuite,BehrouzA.Forouzan,3rd edition,TMH.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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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	S	S	M	S	L	M	L	S	S
CO5	S	S	S	L	S	L	M	L	S	S

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

Coursecode		DataMining	L	T	P	C
Core/Elective/ Supportive		Elective:III	5	0	0	4
Pre-requisite		Basic knowledge on data, database, and statistical functions	Syllabus Version		2021-22 Onward	
Course Objectives:						
The main objectives of this course are to: 2. To introduce the concept of data mining as an important tool for enterprise data management and cutting edge technology for building competitive advantage. 2. To enable students to effectively identify sources of data and process it for data mining 3. To make students well versed in all data mining algorithms, methods of evaluation. 4. To impart knowledge of tools used for data mining 5. To provide knowledge on how to gather and analyze a large set of data to gain useful business understanding.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Identify data mining tools and techniques in building intelligent machines understand					K1-K2
2	Analyze various data mining algorithms in applying in real time applications.					K2-K4
3	Demonstrate the data mining algorithm to combinatorial optimization problems					K2-K3
4	Illustrate the mining techniques like association, classification and clustering on transactional databases.					K2-K3
5	Perform exploratory analysis of the data to be used for mining.					K3-K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Unit:1						
BASIC DATAMINING TASKS			15 hours			
Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.						
Unit:2						
DATAMINING TECHNIQUES			12 hours			
Data Mining Techniques – a Statistical Perspective on data mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.						
Unit:3						
CLASSIFICATION			15 hours			
Classification: Introduction – Statistical – Based Algorithms – Distance Based Algorithms – Decision Tree – Based Algorithms – Neural Network Based Algorithms – Rule Based Algorithms – Combining Techniques.						
Unit:4						
CLUSTERING			15 hours			
Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms. Partitional Algorithms.						
Unit:5						
ASSOCIATION RULES			15 hours			
Association Rules: Introduction – Large Item Sets – Basic Algorithms – Parallel & Distributed						

Algorithms–ComparingApproaches –IncrementalRules –AdvancedAssociationRulesTechniques –Measuring theQuality ofRules.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars –webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	MargarethH.Dunbam,DataMiningIntroductoryandAdvanced Topics,PearsonEducation–2003.	
2	ArunK.Pujari,“DataMiningTechniques”,UniversitiesPress,2010.	
ReferenceBooks		
1	JiaweiHan&MichelineKamber,DataMiningConcepts&Techniques,2001AcademicPress.	
2	K.P.Soman,ShyamDiwakar,V.Ajay,“InsightintoDataMining –TheoryandPractice”,PrenticeHall ofIndia, 2009.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
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CourseDesignedBy:		

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

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

Coursecode		OpenSourceSoftware	L	T	P	C
Core/Elective/ Supportive		Elective:III	5	0	0	4
Pre-requisite		BasicunderstandinginscriptinglanguageandSQL	Syllabus Version		2021-22 Onward	
CourseObjectives:						
Themain objectives ofthis courseareto: 1. Toexposestudentsto freeopensourcesoftwareenvironment and introducethem touseopensourcepackages. 2. DemonstratedifferentopensourcetechnologylikeLinux,PHP&MySQLwithdifferentpacka ges. 3. Tounderstand open sourcesoftwarepractices andtools. 4. Touseetheopensourcesoftwareinoperatingsystems,Programmingandwebframeworkinapproach ingreal timeapplications.						
ExpectedCourseOutcomes:						
Onthesuccessful completionofthecourse,student willbe ableto:						
1	Understandthesignificanceof opensourcepractices andguidelines.					K2
2	Manipulateopensource databasesbasedonuserrequirements					K3
3	Implementwebprogramming withPHP					K3
4	Integrateopensourcewebframeworksinanapplication					K4
5	Writedesktop and web applications with Python					K6
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create						
Unit:1						
INTRODUCTIONTOOPEN SOURCE		15hours				
Introduction to open sources – Need of open sources – advantages of open sources –application ofopen sources. Open source operating systems: LINUX: Introduction – general overview – Kernelmodeandusermode–process–advancedconcepts–scheduling–personalities–cloning–signals –developmentwithLinux.						
Unit:2						
MYSQL		12hours				
MySQL: Introduction – setting up account – starting, terminating and writing your own SQLprograms-record selection Technology – working with strings – Date and Time – sorting Queryresults –generating summary –working withmetadata–using sequences–MySQLandWeb.						
Unit:3						
PHP		15hours				
PHP:Introduction–programminginwebenvironment–variables–constants–datatypes–operators – statements – functions – arrays – OOP – string manipulations and regular expression –file handling and data storage – PHP and SQL database – PHP and LDAP – PHP connectivity –sendingand receiving E-mails–debugging and errorhandling–security –templates.						
Unit:4						
PYTHON		15hours				
Syntaxandstyle–Pythonobjects–numbers–sequences–strings–listsandtuples–dictionaries –conditionalloops–files–inputandoutput–errorsandexceptions–functions–modules–classesand OOP– execution environment.						

Unit:5	PERL	15hours
Pertbackgrounder–pertoverview–pearlparsingrules–variablesanddata–statementsandcontrolstructures –subroutines -packages andmodules–workingwith files–datamanipulation.		
Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars –webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	TheLinuxKernel Book,RemyCard, EricandFrankMevel,Wiley Publications2003.	
2	MySQLBible,SteveSuchring,John Wiley2002.	
ReferenceBooks		
1	ProgrammingPHP,RasmusLerdorfandLevinTatroe,O__Reilly,2002	
2	CorePythonProgramming,WesleyJ. Chun,PrenticeHall,200	
3	Perl:TheCompleteReference,2ndEdn, MartinC.Brown,TMH,2009	
4	MySQL:TheCompleteReference,2ndEdn, VikramVaswani,TMH,2009	
5	PHP:TheCompleteReference,2ndEdn,SteveHolzner,TMH2009.	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]		
1		
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3		
CourseDesignedBy:		

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

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

Coursecode	InternetofThings (IoT)	L	T	P	C
Core/Elective/ Supportive	Elective:III	5	0	0	4
Pre-requisite	Studentsshouldhavethebasicunderstandingoflogical circuitsand hardwarearchitecture.	Syllabus Version	2021-22 Onward		
CourseObjectives:					
Themain objectives ofthis courseareto: 1. Tolearntheconcepts of IoTanditsprotocols. 2. TolearnhowtoanalysisthedatainIoT. 3. TodevelopIoTinfrastructureforpopularapplications. 4. Toreportaboutthe IoTprivacy,securityandvulnerabilitiessolution					
ExpectedCourseOutcomes:					
Onthesuccessfulcompletion ofthecourse, studentwill beable to:					
1	TounderstandthefundamentalsofInternetof Things.				K1
2	Toknowthebasicsofcommunicationprotocolsandthedesigningprinciplesof Webconnectivity.				K2
3	Togaintheknowledgeof Internetconnectivityprinciples				K2-K3
4	DesigninganddevelopsmartcityinIoT				K2-K3
5	Analyzingandevaluatethedatareceivedthrough sensorsinIOT.				K4-K5
K1-Remember; K2-Understand;K3-Apply;K4-Analyze;K5 -Evaluate; K6 -Create					
Unit:1	INTRODUCTION			15hours	
Introduction-Definition&characteristicsofIoT-physicaldesignofIoT-logicaldesignofIoT-IoTenablingTechnologies-IoTlevels&Deploymenttemplates.DomainspecificIots:Home Automation-cities-Environment-Energy-retail-logistics-Agriculture-IndustryiHealthandlifestyle.					
Unit:2	IOT and M2M			12hours	
IoTandM2M-DeferencebetweenIoTandM2M-SDNandNFVforIoTsystemsmanagement-SNMP - YANG -NETOPEER					
Unit:3	IOT SPECIFICATION			15hours	
IoT platforms design Methodology - purpose and specification - process specification - Domainmodelspecification-Informationmodelspecification-Servicespecification-IoTlevels specification-functionalviewspecification-operationalviewspecification-Deviceand component Integrators-ApplicationDevelopment.					
Unit:4	LOGICALDESIGNUSINGPYTHON			15hours	
Logical design using python - Installing python - type conversions - control flow - functions - modules - File handling - classes. IoT physical devices and End points, building blocks of IoTdevice-Raspberry Pi -Linux on RaspberryPi-Raspberry Piinterfaces.					
Unit:5	IOTANDCLOUDCOMPUTING			15hours	
IoTphysicalservers&cloudcomputing- WAMP- XivelycloudforIoT- pythonWebapplicationframework-Amazon web services for IoT.					

Unit:6	ContemporaryIssues	3hours
Expertlectures,onlineseminars –webinars		
	TotalLecturehours	75hours
TextBook(s)		
1	Internet of Things - A hands on Approach Authors: ArshdeepBahga, Vijay MadisetiPublisher:Universities press.	
ReferenceBooks		
1	Internet of Things - Srinivasa K.G., Siddesh G.M. HanumanthaRaju R. Publisher: CengageLearning India pvt. Ltd (2018)	
RelatedOnlineContents[MOOC,SWAYAM, NPTEL, Websitesetc.]		
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CourseDesignedBy:		

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

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

Coursecode		Programming Lab – Software Testing	L	T	P	C
Core/Elective/Supportive		Skillbased Subject Lab:4	0	0	3	3
Pre-requisite		Basic knowledge on software project development in SDLC	Syllabus Version		2021-22 Onward	
Course Objectives:						
The main objectives of this course are to: 1. To gain knowledge about recording the test case in different modes. 2. To design and construct the test cases using Test Script Language. 3. To learn about GUI objects and bitmap objects						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the importance of software quality/software testing and apply software testing techniques for information systems development.					K1
2	Generate test cases from software requirements using various test processes for continuous quality improvement.					K2
3	Understand flow graphs and apply path testing.					K3
4	Apply software testing techniques in commercial environments and assess the adequacy of test suites using control flow, data flow and program mutation.					K4
5	Identify the inputs and deliverables of the testing process and work together as a team in preparing a report					K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5 -Evaluate; K6 -Create						
Programs						
				36 hours		

Write at least 10 TEST CASES for the following programs. Test cases can be for Input data, Conditional expressions, control transfer, output, etc. Run-Test-Debug-until all the test cases are in success status. Marks distribution as follows:

1. List of Test Descriptions (at least 10) for the Program. (20%)
2. Test Cases (40%)
3. Program with all test case results success (30%)
4. Record (10%)

TEST CASE EXAMPLE:

Test-Id	Test Description	Test Steps	Expected Output	Actual Output	Status
TC-01	Acceptance of 10 digit input data	Input 10 Digit Number	Accepting 10 digit number	Accepted 10 digit number	Success
TC-02	Non-acceptance of character data	Input a character data X	Character X should not be accepted	Accepting Character data	Failure

Modify PIC X(10) into PIC 9(10) and then run program for Test-id TC-02 again

Test-Id	Test Description	Test Steps	Expected Output	Actual Output	Status
TC-02	Non-acceptance of character data	Input a character data X	Character X should not be accepted	Character data not accepted	Success
TC-03	Digit sum of 10 digits in single digit	Output data	Single digit sum	Single digit Sum	Success

1. Test the C program: Finding the sum of individual digits of a 10-digit number until a single digit is produced.
2. Test the C Program: Accept the inputs student name, marks in five subjects and declare the result as PASS if the student gets minimum 40 in each subject; otherwise declare the result as FAIL.
3. Test the C program: Program for generating n prime numbers
4. Test the C program: Sort and store the elements of two arrays of integers into the third list.
5. Test the C program: Experiment the operations of a stack using array implementation.
6. Test the C program: Menu-driven option for queue operations like add, remove and display.
7. Test the C++ program: Palindrome string checking program (using pointers)

	Total Lecture hours	36 hours
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Text Book(s)

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Reference Books

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

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Course Designed By:

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

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



Annexure

B.Sc.ComputerScience

Syllabus
(Witheffectfrom2021-2022)

Program Code:22K



DEPARTMENT OF COMPUTER SCIENCE
Bharathiar University

**(A State University, Accredited with “A” Grade by NAAC
and 13th Rank among Indian Universities by MHRD-
NIRF) Coimbatore 641 046, INDIA**

BHARATHIAR UNIVERSITY :: COIMBATORE

641046 DEPARTMENT OF COMPUTER SCIENCE

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.

