B.Sc.ComputerScience

Syllabus

AFFILIATEDCOLLEGES

Program Code:22K

2023– 2024onwards

BHARATHIARUNIVERSITY

(AStateUniversity,Accreditedwith"A++" Gradeby NAAC,Ranked 21stamongIndianUniversitiesby MHRD-NIRF)

Coimbatore-641046 TamilNadu India

ProgramEducationalObjectives(PEOs)	
The**B.Sc.ComputerScience**programdescribeaccomplishmentsthatgraduatesare expectedtoattainwithinfivetosevenyearsaftergraduation	
PEO1	Toenrichknowledgeincoreareasrelatedtothefieldofcomputerscienceand mathematics.
PEO2	To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0tools and techniques and there by design and implement software projects tomeetcustomer's businessobjectives.
PEO3	To enable graduates to pursue higher education leading to Master and ResearchDegrees or have a successfulcareer in industries associated with ComputerScienceorasentrepreneurs
PEO4	Toenhancecommunicativeskillsandinculcateteamspiritthroughprofessional activities,skillsinhandlingcomplexproblemsindataanalysisandresearchprojectto makethem abetterteam player.
PEO5	Toembedhumanvaluesandprofessionalethicsintheyoungmindsandcontribu tetowards nationbuilding.
PEO9	Todevelopproject

ProgramSpecificOutcomes(PSOs)	
Afterthesuccessful completionof**B.Sc.ComputerScience**program,thestudentsareexpectedto	
PSO1	ImpartthefundamentalprinciplesandmethodsofComputerSciencetoawide rangeofapplications.
PSO2	Developanddeployapplicationsofvaryingcomplexityusingtheacquiredknowledgeinv ariousprogramminglanguages,datastructuresandalgorithms, databaseandnetworkingskills.
PSO3	Toinvestigate,analyzecomplexproblemsbytheapplicationofsuitablemathematicaland researchtools,todesignInformationTechnologyproductsand solutions
PSO4	Toidentifyandutilizethestate-of-the-arttoolsandtechniquesinthedesignanddevelopmentofsoftwareproducts and solutions.
PSO5	Abilitytoidentify,interpret,analyzeanddesignsolutionsusingappropriatealgorithms of varying complexities in the field of information and communicationtechnology.

ProgramOutcomes(POs)	
Onsuccessful completionoftheB.Sc.**ComputerScience**program	
PO1	**Disciplinaryknowledge:**Capabletoapplytheknowledgeofmathematics,algorithmicprinciplesandcomputingfundamentalsinthemodelinganddesign ofcomputerbasedsystemsofvaryingcomplexity.
PO2	**Scientificreasoning/Problemanalysis**:Abilitytocriticallyanalyze,categorizes,formulateandsolvetheproblemsthatemergesinthefieldofcomputerscience.
PO3	**Problem solving:** Able to provide software solutions for complex scientific andbusinessrelatedproblemsorprocessesthatmeetthespecifiedneedswithappropriate considerationforthepublichealthandsafetyandthecultural,societal andenvironmentalconsiderations.
PO4	**Environmentandsustainability:**Understandtheimpactofsoftwaresolutionsinenvironmentalandsocietalcontextandstriveforsustainabledevelopment.
PO5	**Moderntool usage:**Usecontemporary techniques, skillsand toolsnecessary forintegratedsolutions.
PO6	**Ethics:** Function effectively with social, cultural and ethicalresponsibilityasanindividualorasateammemberwithpositive attitude.
PO7	**Cooperation/TeamWork:**Functioneffectivelyasmemberorleaderonmultidisciplinaryteams toaccomplish acommonobjective.
PO8	**CommunicationSkills:** An ability tocommunicateeffectively withdiversetypes of audience and also able to prepare and present technical documents todifferentgroups.
PO9	**Self-directedandLife-longLearning:**Graduateswillrecognizetheneedfor self-motivationtoengageinlifelonglearningtobeinparwithchangingtechnology.
PO10	Enhancetheresearchcultureandupholdthescientificintegrityandobjectivity

BHARATHIARUNIVERSITY::COIMBATORE641046

B.Sc.ComputerScience(CBCSPATTERN)

(*Forthestudentsadmittedfromtheacademicyear**2023-2026Batch***)

SchemeofExamination

Part	Titleofthe Course	Hours/ Week	Examination				Credits
			Duration InHours	MaximumMarks			
				CIA	CEE	Total	
	Semester I						
I	Language-I	4	3	25	75	100	4
II	English-I	4	3	25	75	100	4
III	Core1:Computing Fundamentals and CProgramming	5	3	25	75	100	4
III	Core2:DigitalFundamentalsandComputer Architecture	5	3	25	75	100	4
III	CoreLab1:ProgrammingLab-C	5	3	40	60	100	4
III	Allied1:Mathematical Structures for ComputerScience	5	3	25	75	100	4
IV	EnvironmentalStudies*	2	3	-	50	50	2
	Total	**30**		**165**	**485**	**650**	**26**
	Semester II						
I	Language–II	4	3	25	75	100	4
II	English–II	4	3	25	25	50	2
	Naan Mudhalvan –Skill CourseEffectiveEnglish http://kb.naanmudhalvan.in/images/c/c7/Cambridge_Course_Details.pdf	2		25	25	50	2
III	Core3:C++Programming	5	3	25	75	100	4
III	CoreLab2:ProgrammingLab-C++	5	3	20	30	50	2
III	CoreLab3:InternetBasics	3	3	20	30	50	2
III	Allied2:DiscreteMathematics	5	3	25	75	100	4
IV	ValueEducation–HumanRights*	2	3	-	50	50	2
	Total	**30**		**165**	**385**	**550**	**22**
	Semester III						
I	Language–III	4	3	25	75	100	4
II	English– III	4	3	25	75	100	4
III	Core4:DataStructures	4	3	25	75	100	4
III	Core5:JavaProgramming	4	3	25	75	100	4
III	CoreLab4:ProgrammingLab–Java	3	3	20	30	50	2
III	Allied3:ComputerBased OptimizationTechniques	4	3	25	25	50	2
III	SkillbasedSubject1:SoftwareEngineering AndSoftwareProjectManagement	3	3	30	45	75	3
IV	Naan Mudhalvan Course	2	3	25	25	50	2
IV	Tamil**/AdvancedTamil*(OR)Non-major elective-I(Yoga for HumanExcellence)*/Women'sRights*	2	3	-	50	50	2
	Total	**30**		**200**	**475**	**675**	**27**
	Semester IV						
I	Language–IV	4	3	25	75	100	4
II	English – IV	4	3	25	25	50	2
III	Core6:System SoftwareandOperatingSystem	4	3	25	75	100	4
III	Core7:LinuxandShellProgramming	4	3	25	75	100	3
III	Core Lab5:Linux and ShellProgramming Lab	3	3	20	30	50	2

	NaanMuthalvan– Skill CourseOfficeFundamentals-Lab http://kb.naanmudhalvan.in/Bharathiar_University_(BU)	2		25	25	50	2
III	Allied4:BusinessAccounting	4	3	25	25	50	2
III	Skill based Subject 2 Lab: Software ProjectManagement-Lab	3	3	25	25	50	2
IV	Tamil**/Advanced Tamil* (OR) Non-majorelective-II(GeneralAwareness*)	2	3	-	50	50	2
	Total	**30**		**195**	**405**	**600**	**23**

	Semester V						
III	Core8:RDBMS& Oracle	6	3	25	75	100	4
III	Core9:VisualBasic	6	3	25	75	100	4
III	Core6:ProgrammingLab –VB&Oracle	6	3	30	45	75	4
III	Elective – I PYTHONProgramming/Computer Networks/Organizational Behavior	6	3	25	75	100	4
IV	Naan Mudhalvan Course	2	3	25	25	50	2
III	SkillbasedSubject3:SoftwareTesting	4	3	30	45	75	3
	Total	**30**		**160**	**340**	**500**	**21**
	Semester VI						
III	Core10:Graphics&Multimedia	5	3	25	75	100	4
III	Core11:ProjectWorkLab%%	5	3	25	75	100	4
III	CoreLab7:ProgrammingLab –Graphics&Multimedia	5	3	30	45	75	3
III	Elective–II:NetworkSecurityand Cryptography / Artificial Intelligence andExpert Systems/Web Technology	5	3	25	75	100	4
III	Elective– III:DataMining/OpenSourceSoftware/ Internet of Things(IoT)	5	3	25	75	100	4
III	Skill Based Subject 4(Lab): SoftwareTestingLab	3	3	25	25	50	2
	Naan Muthalvan –Skill CourseCyber 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**		**230**	**395**	**625**	**25**
	GrandTotal			**1115**	**2485**	**3600**	**144**

- *NoContinuousInternalAssessment(CIA),UniversityExaminationsOnly.
- **NoUniversityExaminations,ContinuousInternalAssessment(CIA)Only.

- # Govt –Non-Autonomous Colleges, $ Aided– Non-Autonomous Colleges, @ Self-FinancingColleges(Non–Autonomous)(For theory : CIA – 12, CEE – 38, For Practical : CIA – 20, CEE – 30)

FirstS
emester

Coursecode		ComputingFundamentalsandC Programming	L	T	P	C
Core/Elective/Supportive		CorePaper:1	5	0	0	4
Pre-requisite		Students should have basic ComputerKnowledge	Syllabus Version	2023-24 Onwards		

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. ToimpartknowledgeaboutComputerfundamentals
2. TounderstandtheconceptsandtechniquesinCProgramming
3. Toequipandindulgethemselvesinproblemsolvingusing C

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	LearnabouttheComputerfundamentalsandtheProblemsolving	**K2**
2	Understandthebasicconcepts of Cprogramming	**K2**
3	Describe the reason why different decision making and loop constructs areavailableforiteration inC	**K3**
4	Demonstratethe conceptofUserdefinedfunctions,Recursions,Scopeand LifetimeofVariables,StructuresandUnions	**K4**
5	DevelopCprogramsusingpointersArrays andfilemanagement	**K3**

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

Unit:1	FundamentalsofComputers&ProblemSolvinginC	12hours

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-ProgrammingLanguages-TranslatorPrograms-ProblemSolvingTechniques-OverviewofC.

Unit:2	Overviewof C	15hours

Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - DefiningSymbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special,IncrementandDecrementoperators-ArithmeticExpressions-Evaluationofexpression-precedenceofarithmeticoperators-Typeconversioninexpression– operatorprecedence&
associativity - Mathematical functions - Reading & Writing a character - Formatted input andoutput.

Unit:3	DecisionMaking,LoopingandArrays	15hours

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

Unit:4	User-DefinedFunctions,StructuresandUnions	15hours

User-DefinedFunctions:Introduction–NeedandElementsofUser-DefinedFunctions-Definition-ReturnValuesandtheirtypes-FunctionCalls–Declarations–Categoryof

Functions-NestingofFunctions-Recursion–PassingArraysandStringstoFunctions-TheScope,VisibilityandLifetimeofVariables-MultifilePrograms.StructuresandUnions		
Unit:5	**Pointers&FileManagement**	**15hours**
Pointers: Introduction-Understanding pointers -Accessing the address of a variable Declarationand Initialization of pointer Variable – Accessing a variable through its pointer Chain of pointers-Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays-Pointers andStrings – Array of pointers – Pointers as Function Arguments Functions returning pointers –Pointersto Functions– Pointers andStructures.FileManagementinC.		
Unit:6	**ContemporaryIssues**	**3hours**
ProblemSolvingthroughCProgramming-Edureka		
	TotalLecturehours	**75hours**

TextBook(s)	
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, SecondReprint2008
ReferenceBooks	
1	AshokNKamthane:ProgrammingwithANSIandTurboC,Pearson,2002.
2	HenryMullish&HubertL.Cooper:TheSpritofC,Jaico,1996.
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
1	IntroductiontoProgramminginC-NPTEL
2	ProblemsolvingthroughProgramminginC-SWAYAM
3	CforEveryone:ProgrammingFundamentals-Coursera
CourseDesignedBy:	

MappingwithProgrammeOutcomes										
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 ComputerArchitecture	L	T	P	C
Core/Elective/Supportive		CorePaper:2	5	0	-	4
Pre-requisite		Studentshouldhavebasiccomputer knowledge	Syllabus Version	2023-24 Onwards		

CourseObjectives:

OnsuccessfulcompletionofthissubjectthestudentsshouldhaveKnowledgeon

1. Tofamiliarizewithdifferentnumbersystemsanddigitalarithmetic&logiccircuits
2. TounderstandtheconceptsofCombinationalLogicandSequentialCircuits
3. Toimparttheknowledgeofbuses,I/Odevices,flipflops,Memoryandbusstructure.
4. Tounderstandtheconceptsofmemoryhierarchy andmemoryorganization
5. Tounderstandthevarioustypesofmicroprocessorarchitecture

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Learnthebasicstructureofnumbersystemmethodslikebinary,octalandhexadecimal and understand the arithmetic and logical operations are performed bycomputers.	K3
2	DefinethefunctionstosimplifytheBooleanequationsusinglogicgates.	K1
3	Understand various data transfer techniques in digital computer and control unitoperations.	K2
4	Comparethefunctionsofthememoryorganization	K4
5	Analyzearchitecturesandcomputationaldesignsconceptsrelatedtoarchitecture organizationand addressingmodes	K4

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

Unit:1	NumberSystemandArithmeticcircuits	12hours

NumberSystemandBinaryCodes:Decimal,Binary,Octal,Hexadecimal– Binaryaddition,Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code.Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Half subtractor, Fullsubtractor,Parallelbinarysubtractor-DigitalLogic:TheBasicGates– NOR,NAND,XORGates.

Unit:2	CombinationalLogicandSequentialCircuits	14hours

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

Unit:3	Input–OutputOrganizationandDataTransfer	12hours

Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus VersusMemory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronousdatatransfer:StrobeControlandHandshaking–PriorityInterrupt:Daisy-ChainingPriority,Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – OutputProcessor: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,DonaldPLeach, 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:

MappingwithProgrammeOutcomes

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	5	4
Pre-requisite		StudentsshouldhavebasicknowledgeinCprogrammingand algorithms	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. To practice the Basic concepts, Branching and Looping Statements and Strings in Cprogramming
2. ToimplementandgainknowledgeinArrays,functions,Structures,PointersandFile handling

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Remember and Understand the logic for a given problem and to generate Primenumbers& Fibonacci Series **(Program-1,2,3)**	**K1, K2**
2	ApplytheconceptstoprinttheMagicsquare,Sortingthedata,Strings,Recursive functionsandPointers**(Program-4,5,6,8,10)**	**K2, K3**
3	Rememberthelogicusedincountingthevowelsinasentence **(Program-7)**	**K1**
4	ApplyandAnalyzetheconceptsofStructures andFilemanagement **(Program-9,11,12)**	**K3&K4**

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

Programs	**36hours**
1.WriteaC programtofindthesum,average,standarddeviationforagivensetofnumbers.	
2.WriteaC programto generaten primenumbers.	
3.WriteaCprogramtogenerateFibonacciseries.	
4.WriteaC program toprint magicsquareofordernwheren>3 and nisodd.	
5.WriteaCprogram tosort thegivenset ofnumbers inascendingorder.	
6.WriteaCprogramto checkwhetherthegivenstringis apalindromeornotusingpointers.	
7.WriteaCprogramtocount thenumberofVowels inthegiven sentence.	
8.WriteaCprogram tofindthefactorialofagivennumberusingrecursivefunction.	
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.Writeafunctionusingpointerstoaddtwomatricesandtoreturntheresultantmatrixtothe callingfunction.	
11.WriteaCprogramwhichreceivestwofilenamesasargumentsandcheckwhetherthefile contentsaresameornot.Ifsamedeletethesecondfile	
12.Writea programwhichtakesa fileascommandlineargumentandcopyittoanother file. At theendofthesecondfilewritethetotali)noofcharsii)no.ofwordsandiii)no.oflines.	
TotalLecturehours	**36hours**

TextBook(s)

1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, SecondReprint2008

ReferenceBooks	
1	AshokNKamthane:ProgrammingwithANSIandTurboC,Pearson,2002.
2	HenryMullish&HubertL.Cooper:TheSpritofC,Jaico,1996.
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
1	IntroductiontoProgramminginC–NPTEL
2	ProblemsolvingthroughProgramminginC-SWAYAM
3	CforEveryone:ProgrammingFundamentals–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 abasic understanding of computer programs andcomputer programming language. If you knowthe concepts of C programming it will be mucheasierto understand this course	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Impartknowledgeofobjectorientedprogrammingconceptsandimplementthem inC++
2. Enabletodifferentiateprocedureorientedandobject-orientedconcepts.
3. Equipwiththeknowledgeofconceptof Inheritancesothatlearnerunderstandstheneedofinheritance.
4. Explaintheimportanceofdatahidinginobjectorientedprogramming

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Definethedifferentprogrammingparadigmsuchasprocedureorientedandobject oriented programming methodology and conceptualize elements of OOmethodology	K1
2	Illustrateandmodelrealworldobjectsandmapitintoprogrammingobjectsfora legacysystem.	K2
3	Identifytheconceptsofinheritanceanditstypesanddevelopapplicationsusing overloadingfeatures.	K3
4	Discovertheusageofpointerswithclasses	K4
5	Explaintheusageof Files,templatesandunderstandtheimportanceofexceptionHandling	K5

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

Unit:1	INTRODUCTIONTOC++	10hours

Key concepts ofObject-Oriented Programming –Advantages –ObjectOriented Languages –I/OinC++-C++Declarations.ControlStructures:-DecisionMakingandStatements:If..Else,jump, goto,break,continue,Switchcasestatements-LoopsinC++:for,while,do-functionsinC++-inlinefunctions –Function Overloading..

Unit:2	CLASSESANDOBJECTS	10hours

DeclaringObjects–DefiningMemberFunctions–StaticMembervariablesandfunctions– arrayofobjects–friendfunctions–Overloadingmemberfunctions–Bitfieldsandclasses – Constructoranddestructorwithstaticmembers.

Unit:3	OPERATOROVERLOADING	12hours

Overloadingunary,binaryoperators–OverloadingFriendfunctions–typeconversion– Inheritance:TypesofInheritance–Single,Multilevel,Multiple,Hierarchal,Hybrid,Multipath

inheritance–VirtualbaseClasses–AbstractClasses.		
Unit:4	**POINTERS**	**13hours**
Declaration–PointertoClass,Object–thispointer–PointerstoderivedclassesandBaseclasses –Arrays–Characteristics–arrayofclasses–Memorymodels–newanddeleteoperators–dynamicobject – Binding, Polymorphism andVirtual 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++,Pearson Education,2003.

ReferenceBooks

1	E.Balagurusamy,Object-OrientedProgrammingwithC++,TMH,1998.
2	MariaLitvin&GrayLitvin,C++foryou,Vikaspublication,2002.
3	JohnRHubbard,ProgrammingwithC,2ndEdition,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	5	2
Pre-requisite		Basicunderstandingofcomputerprogramsand computerprogramminglanguagelikeC.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Impartknowledgeofobjectorientedprogrammingconceptsandimplementthemin C++
2. Enabletodifferentiateprocedureorientedandobject-orientedconcepts.
3. Equipwiththeknowledgeofconceptof Inheritancesothatlearnerunderstandstheneedofinheritance.
4. Explaintheimportanceofdatahidinginobjectorientedprogramming

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Definethedifferentprogrammingparadigmsuchasprocedureorientedandobjectoriented programming methodology and conceptualize elements of OO methodology	K1
2	Illustrateandmodelrealworldobjectsandmapitintoprogrammingobjectsforalegacysystem.	K2
3	Identifytheconceptsofinheritanceanditstypesanddevelopapplicationsusingoverloading features.	K3
4	Discovertheusageofpointerswithclasses	K4
5	Explain the usage of Files, templates and understand the importance of exceptionHandling	K5

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

Programs	**36hours**

1. Write a C++ Program to create a class to implement the data structure STACK. Write aconstructortoinitializetheTOPoftheSTACK.WriteamemberfunctionPUSH()toinsertanelement and member function POP() to delete an element check for overflow and underflowconditions..

2.WriteaC++ProgramtocreateaclassARITHMETICwhichconsistsofaFLOATandanINTEGERvariable. WritememberfunctionsADD(),SUB(),MUL(),DIV()toperform addition,subtraction,multiplication,divisionrespectively.Writeamemberfunctiontogetanddisplayvalues.

3.WriteaC++Programtoreadanintegernumberandfind thesum ofallthedigitsuntil itreduces toasingledigitusingconstructors,destructorsandinlinememberfunctions.

4. Write a C++ Program to create a class FLOAT that contains one float data member. Overload allthefourArithmeticoperatorsso that theyoperateon theobject FLOAT

5. Write a C++ Program to create a class STRING. Write a Member Function to initialize, get anddisplay stings. Overload the operators ++ and == to concatenate two Strings and to compare twostringsrespectively.

6.WriteaC++Programtocreateclass,whichconsistsofEMPLOYEEDetaillikeE_Number,E_Name,Department,Basic,Salary,Grade.Writeamemberfunctiontogetanddisplaythem. DeriveaclassPAYfromtheaboveclassandwriteamemberfunctiontocalculateDA,HRAand

PFdependingon thegrade.
7. Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONSCalculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures.Derive three classes SQUARE, RECTANGLE, TRIANGE from class Shape and Calculate AreaandPerimeterofeach classseparatelyanddisplaytheresult.
8. Write a C++ Program to create two classes each class consists of two private variables, a integerand a float variable. Write member functions to get and display them. Write a FRIEND Functioncommon to both classes, which takes the object of above two classes as arguments and theintegerand float valuesofboth objects separatelyand display theresult.
9.WriteaC++ProgramusingFunctionOverloadingtoreadtwoMatricesofdifferentDataTypes suchasintegersandfloatingpointnumbers.Findoutthesumoftheabovetwomatricesseparatelyand display thesum ofthesearrays individually.
10.WriteaC++Program tocheckwhetherthegivenstringisapalindromeornotusingPointers
11.WriteaC++ProgramtocreateaFileand todisplaythecontentsofthatfilewithlinenumbers.
12.WriteaC++Programtomergetwo filesintoasinglefile.

TextBook(s)	
1	AshokNKamthane,Object-OrientedProgrammingwithAnsiAndTurboC++,Pearson Education,2003.
ReferenceBooks	
1	E.Balagurusamy,Object-OrientedProgrammingwithC++,TMH,1998.
2	MariaLitvin&GrayLitvin,C++foryou,Vikaspublication,2002.
3	JohnRHubbard,ProgrammingwithC,2ndEdition,TMHpublication,2002.
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
1	
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4	
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		InternetBasics	L	T	P	C
Core/Elective/ Supportive		CoreLab :3	0	0	3	2
Pre-requisite		KnowledgeofWINDOWSOperatingSystems	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. IntroducethefundamentalsofInternetandtheWebfunctions.
2. Impartknowledgeandessentialskillsnecessarytousetheinternetanditsvariouscomponents.
3. Find,evaluate,anduseonlineinformationresources.
4. UseGoogleAppsforeducationeffectively.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	UnderstandthefundamentalsofInternetandtheWebconcepts	K2
2	Explaintheusageofinternetconceptsandanalyzeitscomponents.	K2
3	Identifyandapplytheonlineinformationresources	K3
4	InspectandutilizetheappropriateGoogleAppsforeducationeffectively	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 othercollege students for your college fest, enclose the invitation as attachment and send the mailtoat least 50recipients.UseCC andBCC options accordingly
2. Open your inbox in the Gmail account created, check the mail received from your peer fromother college inviting you for hiscollege fest, and download the invitation. Reply to themailwith athankyou notefortheinviteandforward themailto otherfriends.
3. Assumethatyouarestudyinginfinalyearofyourgraduationandareeagerlylookingforajob. Visit any job portal and upload yourresume.
4. CreateameetingusingGooglecalendarandsharemeetingidtotheattendees.Transfertheownership to theManageroncethemeetingidis generated.
5. Createalabelandupload bulkcontactsusingimportoptioninGoogleContacts
6. CreateyourownGoogle classroomandinvite allyourfriendsthroughemailid.Poststudy materialinGoogleclassroomusingGoogledrive.Createaseparatefolderforeverysubjectand upload all unit wiseE-ContentMaterials.
7. CreateandshareafolderinGoogleDriveusing‘sharealink’optionandsetthepermissionto access thatfolderby yourfriends only.
8. Createone-pagestoryinyourmother tonguebyusingvoicerecognitionfacilityofGoogleDocs.
9. CreatearegistrationformforyourDepartmentSeminarorConferenceusingGoogle Forms.
10. Createaquestionpaperwithmultiplechoicetypesofquestionsforasubjectofyourchoice,using GoogleForms.
11. CreateaGoogleformwithminimum25questionstoconductaquizandgeneratea

certificateaftersubmission.
12.CreateameetusingGoogleCalendar andrecordthemeet usingGoogleMeet.
13.CreateaGoogleslidesforatopicand sharethesamewithyourfriends.
14.CreatetemplateforaseminarcertificateusingGoogleSlides.
15.CreateasheettoillustratesimplemathematicalcalculationsusingGoogleSheets.
16.Createstudent'sinternalmarkstatementandsharetheGooglesheetsvialink.
17.CreatedifferenttypesofchartsforarangeinCIAmarkstatementusingGoogleSheets.
18.CreateamarkstatementinGoogleSheetsanddownloaditasPDF,.xlsand .csvfiles

TextBook(s)	
1	IanLamont,GoogleDrive& Docsin 30Minutes,2nd Edition.
2	

ReferenceBooks	
1	SherryKinkophGunter,MyGoogleApps,2014.
2	
3	

RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
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

CourseDesignedBy:

MappingwithProgrammeOutcomes										
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

ThirdS
emester

Coursecode		DataStructures	L	T	P	C
Core/Elective/ Supportive		Core:4	4	0	0	4
Pre-requisite		BasicunderstandingofDatastorage,retrievaland algorithms.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tointroducethefundamentalconceptofdatastructures
2. Toemphasizetheimportanceofdatastructuresindevelopingandimplementingefficientalgorithms.
3. Understandtheneedfor DataStructures whenbuildingapplication
4. Abilitytocalculateandmeasureefficiencyofcode
5. Improveprogramminglogicskills.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understandthebasicconceptsofdatastructuresandalgorithms	K1-K2
2	Constructandanalyzeof stackandqueueoperationswithillustrations	K2-K4
3	Enhancetheknowledge ofLinkedListanddynamicstoragemanagement.	K2-K3
4	Demonstratethe conceptoftreesanditsapplications	K2-K3
5	Designandimplementvarioussortingandsearchingalgorithms forapplicationsandunderstandtheconceptoffile organizations	K1-K4

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

Unit:1	INTRODUCTION	9hours

IntroductionofAlgorithms,AnalysingAlgorithms.Arrays:SparseMatrices-RepresentationofArrays.StacksandQueues.Fundamentals-EvaluationofExpressionInfix toPostfixConversion

Unit:2	LINKEDLIST	8hours

LinkedList:SinglyLinkedList-PolynomialAddition-DoublyLinkedListandDynamic–StorageManagement -GarbageCollection andCompaction.

Unit:3	TREES	10hours

BasicTerminology-BinaryTrees-BinaryTreeRepresentations–Binary Trees-Traversal.Graphs:TerminologyandRepresentations-Traversals-ShortestPaths.

Unit:4	SYMBOLTABLE	9hours

SymbolTables:StaticTreeTables-DynamicTreeTables-HashTables:HashingFunctions-Overflow Handling.

Unit:5	**INTERNALSORTING**	**7hours**
InsertionSort-QuickSort-2WayMergeSort-HeapSort.		
Unit:6	**ContemporaryIssues**	**2hours**
Expertlectures,onlineseminars–webinars		
	TotalLecturehours	**45hours**

TextBook(s)	
1	EllisHorowitz,SartajShani,DataStructures,GalgotiaPublication.
2	EllisHorowitz,SartajShani,SanguthevarRajasekaran,ComputerAlgorithms,Galgotia Publication.
3	S.LovelynRose,R.Venkatesan,DataStructures, Wiley IndiaPrivateLimited,2015,1stEdition
ReferenceBooks	
1	Jean-Paul,Tremblay& Paul G.Sorenson , An Introduction to Data structures with ApplicationsTataMcGrawHill Company 2008, 2ndEdition.
2	Samanta.D,ClassicDataStructurePrenticeHallof IndiaPvtLtd2007,9thEdition
3	SeymourLipschutz,DataStructuresMcGrawHillPublications,2014,1stEdition
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	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	4	0	0	4
Pre-requisite		The objective of the course is to train the studentstoacquireproblem-solving skillsthrough objectorientedprogramming	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. ToexposethestudentswiththeintroductiontoOOPsandadvantagesofobjectorientedprogramming.
2. TheconceptsofOOPsmakeiteasytorepresentrealworldentities.
3. Thecourseintroducestheconceptsofconvertingtherealtimeproblemsintoobjectsandmethodsand theirinteraction with oneanothertoattain asolution.
4. SimultaneouslyitprovidesthesyntaxofprogramminglanguageJavaforsolvingtherealworldproble ms.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Thecompetenceandthedevelopmentofsmalltomediumsizedapplication programsthatdemonstrateprofessionallyacceptablecoding	K1-K2
2	Demonstratethe conceptofobjectorientedprogrammingthroughJava	K2-K4
3	ApplytheconceptofInheritance,Modularity,Concurrency,Exceptionshandling anddatapersistencetodevelopjavaprogram	K3
4	Developjavaprogramsforappletsandgraphicsprogramming	K3
5	Understandthefundamentalconceptsof AWTcontrols,layoutsandeven ts	K1-K2

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

Unit:1	FUNDAMENTALSOFOBJECT-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, Stringsand Vectors –Interfaces:MultipleInheritance– Packages:Putting Classes together–MultithreadedProgramming.

Unit:4	**ERRORHANDLING**	**15hours**
ManagingErrorsandExceptions–AppletProgramming–GraphicsProgramming.		
Unit:5	**MANAGINGINPUT/OUTPUTFILESINJAVA**	**15hours**
ConceptsofStreams-StreamClasses–ByteStreamclasses–Characterstreamclasses–Usingstreams–I/OClasses–FileClass–I/Oexceptions–Creationoffiles–Reading/Writing characters,Byte-HandlingPrimitivedataTypes –RandomAccess Files.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars-webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	ProgrammingwithJava–APrimer-E.Balagurusamy,5th Edition,TMH.
2	HerbertSchildt,Java:TheCompleteReference,McGrawHillEducation,OraclePress10thEdition, 2018
3	ProgrammingwithJava–APrimer-E.Balagurusamy,3rdEdition,TMH.
ReferenceBooks	
1	TheCompleteReference Java2 -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	3	2
Pre-requisite		StudentsshouldknowabouttheOOPsconceptand basicknowledgeinjavatheory.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

3. ThemainobjectiveofJAVAProgrammingLabistoprovidethestudentsastrongfoundationonprogramming concepts andits applications throughhands-on training.
4. To practice the Basic concepts, Branching and Looping Statements and Strings in Cprogramming
5. ToimplementandgainknowledgeinArrays,functions,Structures,PointersandFile handling

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	UnderstandthebasicconceptsofJavaProgrammingwithemphasisonethicsandprinciplesofprofessionalcoding	K1, K2
2	Demonstrate the creation of objects, classes and methods and theconceptsofconstructor,methodsoverloading,Arrays,branching andlooping	K2
3	Create data files and Design a page using AWT controls and Mouse Events in JavaprogrammingImplementtheconceptsofcodereusabilityanddebugging.	K2, K3
4	DevelopapplicationsusingStrings,Interfacesand Packagesandapplets	K3
5	ConstructJavaprogramsusingMultithreadedProgrammingandExceptionHandling	K3

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

Programs	**36hours**

1.WriteaJavaApplicationstoextractaportionofa characterstringandprinttheextractedstring.

2.WriteaJavaProgramtoimplementtheconceptofmultipleinheritanceusingInterfaces.

3.WriteaJavaProgramtocreateanExceptioncalledpayout-of-boundsandthrowthe exception.

4.WriteaJavaProgramtoimplementtheconceptofmultithreadingwiththeuseofanythreemultiplicationtables and assign threedifferent priorities to them.

5.WriteaJavaProgramtodrawseveralshapesinthecreatedwindows.

6.WriteaJavaProgramtocreateaframewithfourtextfieldsname,street,cityandpincodewithsuitabletables.Alsoaddabuttoncalledmydetails.Whenthebuttonisclickedits correspondingvaluesare tobeappearedinthetextfields.

7.WriteaJavaProgramtodemonstratetheMultipleSelection List-box.

8.Write aJava Programtocreateaframewiththreetextfieldsfor name,ageandqualificationandatext field formultiplelineforaddress

9.WriteaJavaProgramtocreateMenuBarsandpulldown menus.

10.WriteaJavaProgramtocreateframeswhichrespondtothemouseclicks.Foreachevents withmousesuchasmouseup,mousedown,etc.,thecorrespondingmessagetobe

displayed.		
11. WriteaJavaProgramtodrawcircle,square,ellipseandrectangleatthemouseclickpositions.		
12. WriteaJavaProgramwhichopenanexistingfileandappendtexttothatfile.		
	TotalLecturehours	**36hours**
TextBook(s)		
1	ProgrammingwithJava–APrimer–E.Balagurusamy,5th Edition,TMH.	
2	HerbertSchildt,Java:TheCompleteReference,McGrawHillEducation,OraclePress10th Edition,2018	
3	ProgrammingwithJava–APrimer–E.Balagurusamy,3rd Edition,TMH.	
ReferenceBooks		
1	TheCompleteReference Java2–PatrickNaughton&HebertSchildt,3rd Edition,TMH	
2	ProgrammingwithJava–JohnR.Hubbard,2nd Edition,TMH.	
RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]		
1	https://www.w3resource.com/java-exercises/	
2	https://www.udemy.com/introduction-to-java-programming/	
3		
CourseDesignedBy:		

MappingwithProgrammeOutcomes										
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	4	0	0	3
Pre-requisite		BasicknowledgeontheSoftwareDevelopment LifeCycle.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Toenhancethebasicsoftwareengineeringmethodsandpractices.
2. Tolearnthetechniquesfordevelopingsoftwaresystems.
3. Tounderstandtheobjectorienteddesign.
4. Tounderstandsoftwaretestingapproaches

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understandthebasicconceptsofsoftwareengineering	K1
2	Applythesoftwareengineeringmodelsindevelopingsoftwareapplications	K2-K3
3	Implementtheobjectorienteddesigninvariousprojects	K4
4	Knowledgeonhowtodoasoftwareprojectwithin-depthanalysis.	K3
5	ToinculcateknowledgeonSoftwareengineeringconceptsinturngivesaroad mapto design anewsoftwareproject.	K1-K4

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

Unit:1	SOFTWAREENGINEERING	15hours

Software Engineering: A Layered Technology – Software Process – Software Process Models – The Prototyping. Requirement Engineering– Software prototyping - Elements of analysis model – 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–Blackboxtesting.Unittesting–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,TataMcGrawHill,VEdition.
2	GopalaswamyRamesh,ManagingGlobalSoftwareProjects,TataMcGrawHill,NewDelhi,2002.
3	ProgrammingwithJava–APrimer-E.Balagurusamy,3rdEdition,TMH.
ReferenceBooks	
1	TheCompleteReference Java2–PatrickNaughton&HebertSchildt,3rd Edition,TMH
2	ProgrammingwithJava–JohnR.Hubbard,2nd 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	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

FourthSemester

Coursecode		SystemSoftwareandOperatingSystems	L	T	P	C
Core/Elective/ Supportive		Core:6	4	0	0	4
Pre-requisite		StudentsShouldhavethebasicknowledgeincomputer.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tounderstandtheprocessingofprogramsonacomputersystemtodesignandimplementationoflanguageprocessor.
2. Toenhancetheabilityofprogramgenerationthroughexpansionandgainknowledgeabout Codeoptimization usingsoftwaretools.
3. Studentswillgainknowledgeofbasicoperatingsystemconcepts.
4. Tohaveanin-depthunderstandingofprocessconcepts,deadlockandmemorymanagement.
5. Toprovideanexposuretoschedulingalgorithms,devicesandinformationmanagement.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Knowtheprogramgenerationandprogram executionactivitiesindetail	K1
2	UnderstandtheconceptsofMacroExpansionsandGaintheknowledgeofEditing processes	K2-K3
3	Rememberthebasicconceptsofoperatingsystem	K1
4	Understandthe conceptslikeinterrupts,deadlock,memorymanagementandfilemanagement	K2
5	Analyzethe need forschedulingalgorithmsandimplementdifferentalgorithms used 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	MACHINEANDCOMPILER	15hours

Machinedependentcompilerfeatures-Intermediateformoftheprogram-Machinedependent codeoptimization-Machineindependentcompilerfeatures-Compilerdesignoptions-Divisionintopasses–Interpreters– p-codecompilers-Compiler-compilers.

Unit:3	OPERATINGSYSTEM	15hours

What is an Operating System? – Process Concepts: Definition of Process - Process States-Process States Transition – Interrupt Processing – Interrupt Classes - Storage Management: RealStorage:RealStorageManagementStrategies–ContiguousversusNon-contiguousstorage allocation – 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:AnIntroductiontoSystemsProgramming,Pearson,Third Edition.
2	H.M.Deitel,OperatingSystems,2ndEdition,Perason,2003.

ReferenceBooks	
1	Achy8utS.Godbole,OperatingSystems,TMH,2002.
2	JohnJ.Donovan,SystemsProgramming,TMH,1991.
3	D.M.Dhamdhere,SystemsProgrammingandOperatingSystems,2ndRevisedEdition,TMH.

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	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	4	0	0	3
Pre-requisite		Beforestartingthecoursestudentsshouldhavethebasicknowledgeaboutoperatingsystemand Cprogramming.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Linuxisamulti-userandmulti-taskingoperatingsystemandafterlearningtheconceptsofanoperatingsystem
2. Studentwillbeabletowritesimpleshellprogrammingusing Linuxutilities,pipesandfilters.
3. Thefilesystem,processmanagementandmemorymanagementarediscussed.
4. VariouscommandsusedbyLinuxshellisalsodiscussedwhichmakestheuserstointeractwitheach other.
5. Bourneshellprogrammingisdealtindepthwhichcanbeusedtodevelop applications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Describethe architectureandfeaturesofLinuxOperatingSystemanddistinguishit fromotherOperatingSystem.	K1
2	DevelopLinuxutilitiestoperformFileprocessing,Directoryhandling,UserManagement and displaysystem configuration	K2-K3
3	Developshellscriptsusingpipes,redirection,filtersandPipes	K2
4	Applyandchangetheownershipandfilepermissionsusingadvance Unixcommands.	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 Files and Directories: Introduction – Directory Commands in LINUX – File CommandsinLINUX.

Unit:3	VIEDITOR	15hours

Creatingfilesusingthevieditor:Texteditors–Thevieditor.ManagingDocuments:Locatingfilesin LINUX– Standardfiles – 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.ManagingrepetitivetasksusingShellScripts: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, 1stEdition

ReferenceBooks	
1	RichardPetersen,Linux: TheCompleteReference,SixthEdition,TataMcGraw-Hill PublishingCompanyLimited,NewDelhi,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	3	2
Pre-requisite		Studentsshouldhavethepriorbasicknowledgeinoperating system.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. DescribethearchitectureandfeaturesofLinuxOperatingSystem
2. TocreateprogramsintheLinuxenvironmentusingLinuxutilitiesandcommands.
3. StudentisgivenanintroductionofLinuxshellcommandsandtheywillbeabletowriteownshellscripts.
4. Shellprogrammingisdealtindepthwhichcanbe usedtodevelopapplications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	DevelopLinuxutilitiestoperform Fileprocessing,DirectoryhandlingandUserManagement	K1, K2
2	Understandanddevelop shellscriptsusingpipes,redirection,filters,Pipesand displaysystemconfiguration	K2-K3
3	Developsimpleshellscriptsapplicabletofileaccesspermissionnetworkadministration	K3
4	Applyandchangetheownershipandfilepermissionsusingadvance Unixcommands.	K4-K5
5	Createshellscriptsforrealtimeapplications.	K6

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

Programs **36hours**

1.Writeashellscripttostimulatethefilecommands:rm,cp,cat,mv,cmp,wc,split,diff.

2. Writeashellscripttoshowthefollowingsystemconfiguration:
   a. currentlyloggeduser andhislogname
   b. currentshell,homedirectory,OperatingSystemtype,currentPathsetting,currentworking directory
   c. showcurrentlyloggednumberofusers,showallavailableshells
   d. showCPUinformationlikeprocessortype,speed
   e. showmemoryinformation

3.WriteaShellScripttoimplementthefollowing:pipes,Redirectionandteecommands.

4.Writeashellscriptfordisplayingcurrentdate,username,filelistinganddirectoriesbygettinguserchoice.

5.Writeashell scripttoimplementthefiltercommands.

6.Writeashellscripttoremovethefileswhichhasfilesizeas zerobytes.

7.Writeashellscript tofindthesumoftheindividualdigitsofagivennumber.

8.Writeashellscripttofindthegreatestamongthegivensetofnumbersusingcommandlinearguments.

9.Writeashellscriptforpalindromechecking.

10.Writeashellscripttoprintthemultiplicationtableofthegiven argumentusingforloop.

	TotalLecturehours	**36hours**
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	RichardPetersen,Linux:TheCompleteReference,SixthEdition,TataMcGraw-HillPublishingCompany Limited, NewDelhi, Edition2008.	
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	3	2
Pre-requisite		Basic knowledge in SDLC and managing ofsoftwareprojects	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Togainknowledgeabout howtodevelopprojectplan
2. Tocreaterequirement analysisandspecificationforsoftwareapplications.
3. Studentisgivenanintroductionofvariousphasesofsoftwaredevelopmentlifecyclemodels.
4. Toanalyzethestepsaretobeimplementedusing SDLCtodevelopapplications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	PrepareaProjectPlanwithrequirementanalysisandspecification.	**K1, K2**
2	Understandanddevelopcostestimationmodelforrealtimeapplications.	**K2-K3**
3	Implementtheconceptsofcheckpointsindesignphase	**K3**
4	Analyzethe Developmentphaseofthedatabaseandtextareaoftheapplications.	**K4-K5**
5	CreateSDLCforrealtimeapplications.	**K6**

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

Programs	**36hours**
1.PreparationofProjectManagementPlan.	
2. Using any of the CASE tools, Practice requirement analysis and specification for differentfirms.	
3.Casestudyofcostestimationmodels.	
4.Practiceobjectorienteddesignprinciplesforimplementation.	
5.Practicefunctionorienteddesign.	
6.PracticecreatingsoftwaredocumentationfortheAnalysisphaseofsoftwaredevelopmentlifecycleforareal timeapplication.	
7.PracticecreatingsoftwaredocumentationfortheDevelopmentphaseof software developmentlifecycleforarealtimeapplication.	
8.PracticecreatingsoftwaredocumentationfortheImplementationphaseofsoftwaredevelopmentlifecycleforareal timeapplication.	
9.PracticecreatingsoftwaredocumentationfortheTestingphaseofsoftwaredevelopmentlifecycle forareal timeapplication.	
10.Simulateatoolforpath testingprinciples.	
11.Simulateatoolfortestingbasedoncontrolstructures.	
12.Simulateatoolthatreflectsblackboxtestingconcepts	
TotalLecturehours	**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

FifthSemester

Coursecode		RDBMS&Oracle	L	T	P	C
Core/Elective/ Supportive		Core:8	6	0	0	4
Pre-requisite		Basicknowledgeaboutthedata,tableanddatabaseincomputers	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Thecoursedescribesthedata,organizingthedataindatabase,database administration.
2. Tograspthedifferent issuesinvolvedinthedesignofadatabasesystem.
3. Tostudythephysicalandlogicaldatabasedesignsanddatabasemodelinglikerelational,Hierarchical,networkmodels,databasesecurity,integrityandnormalization.
4. ItalsogivesintroductiontoSQLlanguagetoretrievethedatafromthedatabasewithsuitableapplicationdevelopment.
5. Providestrongfoundationofdatabaseconceptsandtointroducestudentstoapplicationdevelopmentin DBMS.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understand the basic concepts of Relational Data Model, Entity-RelationshipModel andprocess ofNormalization	K1-K2
2	UnderstandandconstructdatabaseusingStructuredQueryLanguage(SQL)in Oracle9i environment.	K1-K3
3	LearnbasicsofPL/SQLanddevelopprogramsusingCursors,Exceptions,Proceduresand Functions.	K1-K4
4	Understand and use built-in functions and enhance the knowledge ofhandlingmultipletables	K1-K3
5	Attainagoodpracticalskillofmanagingandretrievingofdatausing DataManipulationLanguage(DML)	K2-K4

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

Unit:1	DATABASECONCEPTS	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– AnotherExampleofNormalization.

Unit:2	ORACLE9i	15hours

Oracle9*i*: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors &Help – Alternate Text Editors - SQL *Plus Worksheet - *i*SQL *Plus. Oracle Tables: DDL: 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 – RevisitingSubstitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-infunctions–GroupingData.MultipleTables:JoinsandSetoperations:Join–Setoperations.		
Unit:4	**PL/SQL**	**15hours**
PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – DataTypes–OtherDataTypes–Declaration–Assignmentoperation–Bindvariables–Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL:ControlStructures–NestedBlocks–SQL inPL/SQL–DataManipulation–TransactionControl statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors andAttributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause –Cursorwith Parameters–CursorVariables– Exceptions– Types ofExceptions.		
Unit:5	**PL/SQLCOMPOSITEDATATYPES**	**12hours**
PL/SQLCompositeDataTypes:Records–Tables–arrays.NamedBlocks:Procedures–Functions– Packages –Triggers –Data DictionaryViews.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars-webinars		
	TotalLecturehours	**75hours**

TextBook(s)

1	DatabaseSystemsusingOracle,NileshShah,2ndedition,PHI.
2	E-Book:DianaLorentz,"Oracle®DatabaseSQLReference",ORACLE,Dec,2005.
3	E-Book:BillPribyl,StevenFeuerstein,"OraclePL/SQLProgramming",O'ReillyMedia,Inc.,6th Edition, February 2014.

ReferenceBooks

1	DatabaseManagementSystems,Majumdar&Bhattacharya,2007,TMH.
2	DatabaseManagementSystems,GeraldV.Post,3rdedition,TMH.

RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]

1	http://www.digimat.in/nptel/courses/video/106105175/L01.html
2	https://www.tutorialspoint.com/oracle_sql/index.htm

CourseDesignedBy:

MappingwithProgrammeOutcomes

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		Knowledgeinprogramminglanguageandoops concept.	Syllabus Version	2023-24 Onward		

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Themainaimofthecourseistocovervisualbasicprogrammingskillsrequiredformodernsoftware development.
2. Tostudytheadvantages ofControlsavailablewithvisualbasic.
3. Togainabasicunderstandingofdatabaseaccessandmanagementusingdatacontrols.
4. Tofacilitatethelearnertocarryoutprojectworksusingthetoolsavailable inVBandMSAccess.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Demonstratefundamentalskillsinutilizingthetoolsofavisualenvironmentsuch ascommand,menusand toolbars.	**K1**
2	ImplementSDIandMDIapplicationsusingforms,dialogsandothertypesofGUI components.	**K2**
3	UnderstandtheconnectivitybetweenVBwithMS-ACCESSdatabase.	**K3**
4	Implementthemethodsandtechniquestodevelop projects.	**K4**
5	AttainagoodpracticalskillofmanagingODBCandDataAccessObjects	**K2-K4**

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

Unit:1	INTRODUCTIONTOVB	15hours

GettingStartedwithVB6,ProgrammingEnvironment,workingwithForms,Developinganapplication, Variables, Datatypes and Modules,procedures andcontrol structures, arrays.Working withControls:Creatingandusingcontrols,workingwithcontrolarrays.

Unit:2	MENUSINVB	15hours

Menus,MouseeventsandDialogboxes:Mouseevents,Dialogboxes,MDIandFlexgrid:MDI,UsingtheFlex grid control.

Unit:3	ODBCANDDATAACCESSOBJECTS	15hours

ODBCandDataAccessObjects:DataAccessOptions,ODBC,Remotedataobjects,ActiveX EXEandActiveXDLL:Introduction,CreatinganActiveXEXEComponent,CreatingActiveXDLLComponent.

Unit:4	OBJECTLINKINGANDEMBEDDING	15hours

Object Linking and Embedding: OLE fundamentals, Using OLE Container Control, Using OLEAutomation objects, OLE Drag and Drop, File and File System Control: File System Controls,AccessingFiles.

Unit:5	CONTROLSINVB	12hours

AdditionalcontrolsinVB:sstabcontrol,settingpropertiesatruntime,addingcontrolstotab,listcontrol,tabstripcontrol,MSFlexgridcontrol,WhyADO,Establishingareference,Crystaland

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 ItoUnitIV)**
2	ProgrammingwithVisualBasic6.0,MohammedAzam,VikasPublishingHouse,Fourth Reprint,2006.**(UnitV)**
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:	

MappingwithProgrammeOutcomes										
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 oopsconcept.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. TodevelopapplicationsusingGraphicalUserInterfacetools.
2. Tounderstandthedesignconcepts.
3. Todesignandbuilddatabasesystemsanddemonstratetheircompetence.
4. Tocreaterequirement analysisandspecificationforsoftwareapplications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	UnderstandtheconceptsofVisualBasic.	**K1**
2	Learntheadvantagesof ControlsinVB	**K2**
3	Designanddeveloptheevent-drivenapplicationsusingVisualBasicframework.	**K3**
4	Applytheknowledgeof databasemethods.	**K4**
5	LearnbasicsofPL/SQLanddevelopprogramsusingCursors,Exceptions,ProceduresandFunctions	**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 tocreateamenuand MDIForms.

4.Writeaprogramtodisplayfilesinadirectoryusing DriveListBox,DirListBoxandFileListBoxcontrolandopen, editandsavetextfileusingRich textboxcontrol.

5.WriteaprogramtoillustrateCommonDialogControlandtoopen,editandsavetextfile.

6.Writeaprogramtoimplementanimationusingtimers.

7. WriteasimpleVBprogramtoacceptanumber asinputand convertitinto
   a.Binaryb.Octalc.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 anewfield(Alter)calledforNumberofitemandplaceforvaluesforthenewfieldwithout usingPL/SQLblock.

10.WriteaPL/SQLprogramtoimplementtheconceptofTriggers

11.WriteaPL/SQLprogramtoimplementtheconcept“Procedures”.	
12.WriteaVBprogramtomanipulatethestudentmarklistwithoracledatabaseconnectivityprogram.	
TotalLecturehours	**36hours**

TextBook(s)	
1	Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007. **(Unit ItoUnitIV)**
2	ProgrammingwithVisualBasic6.0,MohammedAzam,VikasPublishingHouse,FourthReprint,2006. **(UnitV)**
3	E-Book:BillPribyl,StevenFeuerstein,“OraclePL/SQLProgramming”,O’ReillyMedia,Inc., 6thEdition,February2014.
ReferenceBooks	
1	GrayCornell(2003),”VisualBasic6fromgroundup”TMH,New Delhi,1stEdition,
2	Deitel and Deitel, T.R.Nieto (1998), “Visual Basic 6 – How to Program”, Pearson Education.FirstEdition.
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	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		Knowledgeon logicoftheprogramsandoopsconcept.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. TointroducethefundamentalsofPythonProgramming.
2. ToteachabouttheconceptofFunctionsinPython.
3. ToimparttheknowledgeofLists,Tuples,FilesandDirectories.
4. Tolearnaboutdictionariesinpython.
5. Toexplorestheobject-orientedprogramming,Graphicalprogrammingaspectsofpythonwithhelp ofbuilt inmodules..

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Rememberingtheconceptofoperators,datatypes,loopingstatementsinPython programming.	K1
2	UnderstandingtheconceptsofInput/Outputoperationsinfile..	K2
3	Applyingtheconceptoffunctionsandexceptionhandling	K3
4	Analyzingthestructuresoflist,tuplesandmaintainingdictionaries	K4
5	Demonstratesignificantexperiencewithpythonprogramdevelopmentenvironment	K4-K6

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

Unit:1	BASICSOFPYTHON	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-BitWiseOperators-SimpleInput 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,tupleas returnvalue -Sets –Dictionaries

Unit:3	FUNCTIONS	10hours

FUNCTIONS: Definition - Passing parameters to a Function - Built-in functions- Variable NumberofArguments-Scope–Typeconversion-Typecoercion-PassingFunctionstoaFunction-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-SplittingaString -CompilingRegularExpressions.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars-webinars		
	TotalLecturehours	**55hours**

TextBook(s)	
1	MarkSummerfield,ProgramminginPython3:ACompleteintroductiontothePythonLanguage,Addison-Wesley Professional, 2009.
2	MartinC.Brown,PYTHON:TheCompleteReference,McGraw-Hill,2001
3	E.Balagurusamy(2017), “ProblemSolvingandPythonProgramming”,McGraw-Hill,First Edition.
ReferenceBooks	
1	AllenB.Downey,“ThinkPython:HowtoThinkLikeaComputerScientist”,2ndedition,UpdatedforPython 3, Shroff/O‘Reilly Publishers,2016
2	Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated forPython3.2, Network Theory Ltd., 2011
3	WesleyJChun,CorePythonApplicationsProgramming‖,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		Students should have the knowledge on computerconnectivityandconnectivity peripherals.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Toidentifyvariouscomponentsinadatacommunicationsystemandunderstandstate-of-the-artin network protocols,architectures and applications.
2. Toenablestudentsthroughtheconceptsofcomputernetworks,differentmodelsandtheirinvolvementin each stageofnetworkcommunication.
3. To educate the concepts of terminology and concepts of the OSI reference model and theTCP/IPreferencemodelandprotocols suchas TCP,UDP and IP.
4. Tobefamiliarwiththeconceptsofprotocols,networkinterfaces,anddesign/performanceissuesin local areanetworks and wideareanetworks.
5. Introducethestudenttoanetworkroutingfor IPnetworksandhowacollisionoccursandhowto solveitand howaframeis createdandcharactercountofeach frame.

ExpectedCourseOutcomes:

Onthesuccessfulcompletion ofthecourse,student willbeableto:

1	Remember the organization of computer networks, factors influencing computernetworkdevelopmentandthereasonsforhavingvarietyofdifferenttypesofnetworks.	**K1**
2	UnderstandInternetstructureandcanseehowstandardproblemsaresolvedand theuseofcryptographyandnetworksecurity.	**K2**
3	Apply knowledge ofdifferenttechniquesoferrordetection andcorrectiontodetect andsolveerrorbitduringdatatransmission.	**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 layerin themodels	**K2-K4**

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

Unit:1	BASICSOFNETWORKSANDOSIMODEL	15hours

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

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.Communication Satellites: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 -BroadbandWireless –Bluetooth.		
Unit:4	**NETWORKLAYER**	**15hours**
NETWORKLAYER:Routingalgorithms– CongestionControlAlgorithms.TRANSPORTLAYER:ElementsofTransport Protocols– InternetTransport Protocols:TCP.		
Unit:5	**APPLICATIONLAYER**	**12hours**
APPLICATION LAYER:DNS– E-mail.NETWORK SECURITY: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,and Interfaces,UylessBlack,2nded,PHI
3	
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	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		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tohelpthestudentstodevelopcognizanceoftheimportanceofhumanbehaviour.
2. To enable students to describe how people behave under different conditions and understandwhypeoplebehaveas they do.
3. To provide the students to analyses specific strategic human resources demands for futureaction.
4. To enable students to synthesize related information and evaluate options for the most logicaland optimal solution such that they would be able to predict and control human behaviour andimproveresults.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Demonstratetheapplicabilityoftheconceptoforganizationalbehaviorto understandthebehaviorofpeopleintheorganization.	**K1**
2	DevelopManagerialskillsfor IndividualBehaviors.	**K2**
3	Analyzethecomplexitiesassociatedwithmanagementof thegroup behavior intheorganization.Analyzehowto managetheStress during ajob.	**K3**
4	DevelopanOrganizationalBehaviourmodelforanytypeofOrganization.	**K3**
5	AnalyzetheCommonbiasesanderadicationinDecisionMakingProcess.	**K4**

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

Unit:1	INTRODUCTION	15hours

Introduction toOrganizationalBehavior–Related Disciplines–TheoreticalFramework–OrganizationalApproaches–ModernOrganizationalScenario:Impactof Globalization

Unit:2	INDIVIDUALBEHAVIOR	15hours

IndividualBehavior–Perception–Process–Changes-PersonalityandAttitudes–Job Satisfaction

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 – Thenature ofInformal Organizations – Formal Groups – Interactiveconflict:Interpersonalconflict–Inter-groupbehaviorandconflict–NegotiationSkills:Goingbeyond conflictmanagement–TraditionalNegotiationApproaches-Contemporarynegotiationskills.

Unit:5	COMMUNICATION	12hours
Communication–Roleandbackground–Interpersonalcommunication–Informalcommunication-TheDecisionMakingprocess–ParticipativeDecisionmakingtechniques–Organizationdesign – culture– Organizationchangeanddevelopment		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars-webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	FredLuthans,OrganizationalBehavior,9thEdition,McGrawHill Irwin,2002.
2	JohnW.Newstormand KeithDavis,OrganizationalBehavior,10thEdition.

ReferenceBooks	
1	Robbins,S.P.,&Judge,T.(2013).Organizationalbehavior (15thed.).Boston:Pearson.
2	NewstromJ.W.,&Davis,K.(2011).Humanbehavioratwork (12thed.). TataMcGrawHill

RelatedOnlineContents[MOOC,SWAYAM, NPTEL,Websitesetc.]	
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2	
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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		BasicknowledgeinsoftwareprojectandSDLC	Syllabus		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tostudyfundamentalconceptsinsoftwaretesting
2. Todiscussvarioussoftwaretestingissuesandsolutionsinsoftwareunittest,integrationandsystem testing.
3. To expose the advanced software testing topics, such as object-oriented software testingmethods.
4. Listarangeofdifferentsoftwaretestingtechniquesandstrategiesandbeabletoapplyspecific automated unit testing method totheprojects.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Explainthebasicconceptsandtheprocessesthatleadtosoftwaretesting	**K2**
2	Designtestcases fromthegivenrequirementsusingBlackboxtestingtechniques	**K3**
3	IdentifythetestcasesfromSourcecodebymeansofwhiteboxtestingtechniques	**K3**
4	Knowaboutuseracceptancetestingandgeneratetestcasesforit	**K4**
5	Examinethetestadequacycriteriatocompletethe testingprocess	**K4**

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

Unit:1	SOFTWAREDEVELOPMENTLIFECYCLEMODELS	15hours

SoftwareDevelopmentLifeCyclemodels:PhasesofSoftwareproject–Quality,QualityAssurance, 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 Acceptance Testing: 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 PracticesinRegressionTesting.

Unit:5	TEST PLANNING, MANAGEMENT, EXECUTIONANDREPORTING	12hours
Test Planning, Management, Execution and Reporting: Test Planning – Test Management – TestProcess – Test Reporting –Best Practices. TestMetrics and Measurements: Project Metrics – ProgressMetrics – Productivity Metrics– ReleaseMetrics.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars-webinars		
	TotalLecturehours	**75hours**

TextBook(s)

1	SoftwareTestingPrinciplesandPractices,SrinivasanDesikan&GopalswamyRamesh,2006,Pearson Education.*(UNIT-I:2.1-2.5,3.1-3.4UNIT-II:4.1-4.4,5.1-5.5UNITIII:6.1-6.7 (UNITIV:7.1-7.6,8.1-8.5UNIT-V:15.1-15.6,17.4-17.7)*
2	LimayeM.G.,"SoftwareTestingPrinciples,TechniquesandTools",SecondReprint,TMHPublishers, 2010.
3	AdityaP.Mathur,"FoundationsofSoftwareTesting",2ndEdition,PearsonEducation,2013.

ReferenceBooks

1	EffectiveMethodsofSoftwareTesting,WilliamE. Perry,3rded, Wiley India.
2	SoftwareTesting,RenuRajani,PradeepOak,2007,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	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

SixthSemester

Coursecode		Graphics&Multimedia	L	T	P	C
Core/Elective/ Supportive		Core:10	5	0	0	4
Pre-requisite		Basicknowledgein2D,3Dandmultimediafileformats	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Designandapplytwodimensionalgraphicsandtransformations.
2. Designandapplythreedimensionalgraphicsandtransformations.
3. ApplyIllumination,colormodelsandclippingtechniquestographics.
4. UnderstoodDifferenttypesofMultimediaFileFormat.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Explainapplications,principles,commonlyusedandtechniquesofcomputergraphicsandalgorithmsforLine-Drawing,Circle-GeneratingandEllipse-Generating.	K2
2	Studentswillgettheconceptsof2Dand3D,Viewing,Curvesandsurfaces,Hidden Line/surfaceeliminationtechniques	K3
3	StudiesconceptsofMultimediaSystems,Text,AudioandVideotools	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

2DGeometricTransformations:BasicTransformations–MatrixRepresentations–CompositeTransformations–OtherTransformations.2DViewing:TheViewingPipeline–ViewingCo-ordinateReferenceFrame–Window-to-ViewportCo-ordinateTransformation-2DViewingFunctions–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–NatureofSoundWaves–Fundamental CharacteristicsofSound – 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 – Creating Movement – Principles of Animation – Some Techniques of Animation –Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio –MPEG-1Video -MPEG-2Audio – MPEG-2 Video.		
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,ArunDUdai,TMH.
2	Multimedia:MakingitWork,TayVaughan,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	4
Pre-requisite		Studentsshouldhavethestrongknowledgeinany oneoftheprogramminglanguagesinthiscourse.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscoursearеto:

1. Tounderstandandselect thetaskbasedontheircoreskills.
2. Togettheknowledge aboutanalyticalskillforsolvingtheselectedtask.
3. Togetconfidenceforimplementingthetaskandsolvingtherealtimeproblems.
4. Expresstechnicalandbehavioralideasandthoughtinoralsettings.
5. Prepareandconductoralpresentations

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Formulatearealworldproblemanddevelopitsrequirementsdevelopadesignsolutionfor aset ofrequirements.	**K3**
2	Testandvalidatetheconformanceofthedevelopedprototypeagainsttheoriginalrequirements oftheproblem.	**K5**
3	Workasaresponsiblememberandpossiblyaleaderofateamindevelopingsoftwaresolutions.	**K3**
4	Expresstechnicalideas,strategiesandmethodologiesinwrittenform.Self-learn new tools, algorithms and techniques that contribute to the software solution oftheproject.	**K1-K4**
5	Generatealternativesolutions,comparethemandselecttheoptimumone.	**K6**

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

AIMOFTHEPROJECTWORK

1. The aim of the project work is to acquire practical knowledge on the implementation of theprogrammingconcepts studied.
2. Each student should carry out individually one project work and it may be a work using thesoftware packages that they have learned or the implementation of concepts from the papersstudiedorimplementationofanyinnovativeideafocusingonapplicationorientedconcepts.
3. The project work should be compulsorily done in the college only under the supervision of thedepartmentstaffconcerned.

VivaVoce

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) andExternalExaminers,afterdulyverifyingthe**AnnexureReport**availableintheCollege,foratotal of100 marks at thelast day ofthepracticalsession.

1. Out of 100 marks, 25 marks for CIA and 75 for CEE (50 evaluation of project report + 25VivaVoce).

ProjectReportFormat

PROJECTWORK

TITLEOFTHEDISSERTATION

BonafideWorkDonebyS

TUDENT

NAMEREG.NO.

Dissertationsubmittedinpartialfulfillmentoftherequirementsfortheawardof

<NameoftheDegree>

ofBharathiarUniversity,Coimbatore-46**.**

CollegeLogo

SignatureoftheGuide SignatureoftheHOD

SubmittedfortheViva-VoceExaminationheldon _____

InternalExaminer ExternalExaminer

Month–Year

CONTENTS

Acknowledgement
Contents
Synopsis
1. Introduction Organiza
tion ProfileSystem
SpecificationHardware
ConfigurationSoftwareS
pecification
2. SystemStudy
ExistingSystem
Drawbacks

ProposedSystem
Features

3. SystemDesignandDevelopment

File DesignInput
DesignOutput
DesignDatabase
Design
SystemDevelopment
DescriptionofModules(Detailedexplanationabouttheprojectwork)

4. TestingandImplementation

5. Conclusion

Bibliography

Appendices

A. DataFlowDiagram
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		Programming Lab – Graphics&Multimedia	L	T	P	C
Core/Elective/Supportive		CoreLab :7	0	0	5	3
Pre-requisite		StudentsshouldhavethebasicknowledgeonCand C++ to do computer graphics andmultimediaapplications.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tolearnthebasicprinciplesof2-dimensionalcomputergraphics.
2. Provideanunderstandingofhowtoscanconvertthebasicgeometricalprimitives,howtotransformth eshapes to fit them asperthepicturedefinition.
3. Provideanunderstandingof mappingfromaworldcoordinatestodevicecoordinates,clippingand projections.
4. Tobeabletodiscusstheapplicationofcomputergraphicsconceptsinthedevelopmentofcompute rgames, information visualizationand business applications.
5. Tocomprehendandanalysethefundamentalsofanimation,virtualreality,underlying technologies,principlesandapplications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understandthebasicconceptsofcomputergraphics.	**K1**
2	Designscanconversion problemsusingCandC++programming.	**K2**
3	Applyclippingandfillingtechniquesformodifyinganobject.	**K3**
4	Understandthe conceptsofdifferenttypeofgeometrictransformationofobjectsin 2D.	**K4**
5	Understandanddevelop thepracticalimplementationofmodeling,rendering, viewingofobjectsin 2D	**K6**

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

Programs	**36hours**
Graphics	
1.Writeaprogramtorotateanimage.	
2.Writeaprogram todropeachwordofasentenceoneby onefrom thetop.	
3.Writeaprogramto dropalineusingDDAAlgorithm.	
4.Writeaprogramtomoveacar withsoundeffect.	
5.Writeaprogramto bounceaball andmoveit withsoundeffect.	
6.Writeaprogramto testwhetheragiven pixelisinsideoroutsideoron apolygon.	
Multimedia	
7.CreateSun FlowerusingPhotoshop.	
8.AnimatePlaneflying intheClouds usingPhotoshop.	
9.CreatePlasticSurgeryfortheNoseusingPhotoshop.	
10.CreateSee-throughtextusingPhotoshop.	
11.CreateaWebPageusingPhotoshop.	
12.ConvertBlackandWhitePhoto toColorPhotousingPhotoshop.	
TotalLecturehours	**36hours**

TextBook(s)	
1	ComputerGraphics,DonaldHearn,M.PaulineBaker,2nd edition,PHI.
2	PrinciplesofMultimedia,RanjanParekh,2007,TMH.
ReferenceBooks	
1	ComputerGraphics,AmarendraNSinha,ArunDUdai,TMH.
2	Multimedia:MakingitWork,TayVaughan,7th edition,TMH.
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	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 innetworking	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tolearntheneedfornetworksecurityandsecurityapproaches.
2. Toinculcatetheconceptoftransferringauthenticdataalongthenetworkwithseveralmetho dsand algorithms.
3. Toenrichtheknowledgeondifferenttypesof InternetSecurityProtocols.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Rememberthebasic conceptofCryptographyandvarioustypesofattacks.	K1
2	UnderstandaboutvarioustypesofprotocolsforInternetSecurity.	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 –blockchipperdesignprinciplesandmodesofoperation.

Unit:2	TYPESOFDES	12hours

Tripledes-blowfish–RCSAdvancedSymmetricBlockCiphers– RC4streamCipherconfidentiallyusingsymmetricencryption–introductiontonumbertheory–public– keycryptographyandRSA.

Unit:3	KEYMANAGEMENT	15hours

Keymanagement–DiffleHellmankeyexchange–messageauthenticationandhashfunction–hashalgorithm– digitalsignatureandauthentication protocols– digitalsignaturestandard.

Unit:4	AUTHENTICATION	15hours

Authenticationapplication–prettygoodprivacy–S/MIME–ipsecurity–websecurityconsiderations– securesocketlayertransportlayer security–secureelectronictransaction.

Unit:5	INTRUDERS	15hours

Intruders–intrusiondetection–passwordmanagement–virusesandrelatedthreats–virus countermeasures–firewalldesignprinciples–trustedsystems

Unit:6	ContemporaryIssues	3hours

Expertlectures,onlineseminars–webinars

	TotalLecturehours	75hours

TextBook(s)	
1	WilliamStallings,CryptographyandNetworkSecurityPrinciplesandPractices,Fourthedition,PHIEducation Asia
ReferenceBooks	
1	AtulKahate,CryptographyandNetworkSecurity,2ndEdition,TMH.
2	BehrouzA.Forouzan,CryptographyandNetworkSecurity,TMH.
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	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, reasoningandproblemsolvingskills	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. TounderstandthebasicconceptsofArtificial IntelligenceandidentifytheAIproblemsanddomains.
2. Toprovidesearchtechniquestosolvetheproblems.
3. Torepresentandaccessthedomainspecificknowledge.
4. Abilitytoapplyknowledgerepresentation,reasoning,andmachinelearningtechniquestoreal-worldproblems

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	UnderstandthenatureofAIproblemsandtaskdomainsofAI.	**K1**
2	Applytheappropriatesearchprocedures tosolvetheproblemsbyusingbestalgorithms.	**K2**
3	Analyzeandselectthesuitableknowledgerepresentationmethod.	**K3**
4	Manipulatetheacquiredknowledgeandinfernewknowledge.	**K4**
5	DemonstratethedevelopmentofAIsystemsbyencodingtheknowledge.	**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

Knowledge representation issues: Representations and mappings – Approaches to Knowledgerepresentations–Issuesin Knowledgerepresentations–FrameProblem.

Unit:4	PREDICATELOGIC	15hours

UsingPredicateLogic:Representingsimplefactsinlogic–RepresentingInstanceandIsa relationships–Computablefunctionsandpredicates–Resolution–Naturaldeduction.

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-ExpertSystemTools.

Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars–webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	ArtificialIntelligence,ElaineRichandKelvinKnight,TMH,2ndEdn,1991
2	Artificial Intelligence A Modern Approach, Stuart Russell & Peter Norvig, 2nd EditionPerason.

ReferenceBooks	
1	ArtificialIntelligence,GeorgeFLuger,4thEdition,Pearson,2002.
2	FoundationsofArtificial IntelligentandExpertSystems,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,browserandwebapplication	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Oncompletionofthiscourse,astudentwillbefamiliarwithclientserver architectureandableto develop aweb applicationusing javatechnologies.
1. Studentswillgainthe skills and project-basedexperienceneededforentry into webapplicationand development careers
3. Understandbesttechnologiesforsolvingwebclient/serverproblems
4. UseJavascriptfordynamiceffectsandtovalidateforminputentry
5. AnalyzetoUseappropriateclient-sideorServer-sideapplications

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	UnderstandandanalysetheTCP/IPbasics.	**K1**
2	UnderstandDomainservername,FTP,TFTP,basicsofWWW,webbrowser architecture.	**K2**
3	Knowledgeof Microsoftandjavatechnologies,dynamic webpages,DHTML,ASP andJSP.	**K2-K3**
4	Understandingactivewebpages,JavaApplet,Javabean,CORBA,RMIandEDI architecture	**K2-K3**
5	KnowledgeonXML,XMLparser, 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-PersistentTCPconnections–UDP–DifferencesbetweenTCPand 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 –ASPExample– Modern TrendsinASP– JavaandJVM– JavaServlets–JavaServerPages.

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– SignificanceofEDI– Financial EDI– EDIandinternet.		
Unit:5	**XML**	**15hours**
XML: SGML–Basicsof XML–XMLParsers –Needfor a standard.WAP:Limitations ofMobile 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:5.1-5.4,6.1-6.7 UNITIII:8.1-8.1,9.1-9.13UNITIV:10.1-10.7,15.1-15.3,16.1-16.8UNIT-V:17.1-17.4,18.1-18.6)*

ReferenceBooks	
1	InternetandWebTechnologies,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, andstatisticalfunctions	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

2.TointroducetheconceptofdataMiningasanimportanttool forenterprisedatamanagementandcutting edgetechnology forbuilding competitiveadvantage.
2. Toenablestudentstoeffectivelyidentifysourcesofdataandprocessitfordatamining
3. Tomakestudentswellversedinalldataminingalgorithms,methodsofevaluation.
4. Toimpartknowledgeoftoolsused fordatamining
5. Toprovideknowledgeon howtogatherandanalyzelargesetsofdatatogain usefulbusinessunderstanding.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Identifydataminingtoolsandtechniquesinbuildingintelligentmachines understand	**K1-K2**
2	Analyzevariousdataminingalgorithmsinapplyinginrealtimeapplications.	**K2-K4**
3	Demonstratethedataminingalgorithmstocombinatorialoptimizationproblems	**K2-K3**
4	Illustratetheminingtechniqueslikeassociation,classificationandclusteringon transactionaldatabases.	**K2-K3**
5	Performexploratoryanalysisofthedatatobeusedformining.	**K3-K6**

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

Unit:1	BASICDATAMININGTASKS	15hours

Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data MiningIssues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data BasePerspective.

Unit:2	DATAMININGTECHNIQUES	12hours

DataMiningTechniques–aStatisticalPerspectiveondatamining–SimilarityMeasures–DecisionTrees– Neural Networks– GeneticAlgorithms.

Unit:3	CLASSIFICATION	15hours

Classification:Introduction–Statistical–BasedAlgorithms–DistanceBasedAlgorithms–DecisionTree– BasedAlgorithms–NeuralNetworkBasedAlgorithms–RuleBasedAlgorithms–Combining Techniques.

Unit:4	CLUSTERING	15hours

Clustering:Introduction–SimilarityandDistanceMeasures–Outliers–HierarchicalAlgorithms. PartitionalAlgorithms.

Unit:5	ASSOCIATIONRULES	15hours

AssociationRules:Introduction-LargeItemSets–BasicAlgorithms–Parallel&Distributed

Algorithms–ComparingApproaches–IncrementalRules—MeasuringtheQualityofRules.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars–webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	MargaretH.Dunbam,DataMiningIntroductoryandAdvancedTopics,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		Basicunderstandinginscriptinglanguageand SQL	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Toexposestudentstofreeopensourcesoftwareenvironmentandintroducethemtouseopenso urcepackages.
2. DemonstratedifferentopensourcetechnologylikeLinux,PHP&MySQLwithdifferentpacka ges.
3. Tounderstandopensourcesoftwarepracticesand tools.
4. Tousetheopensourcesoftwareinoperatingsystems,Programmingandwebframeworkinapproach ingreal timeapplications.

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understandthesignificanceofopensourcepracticesandguidelines.	**K2**
2	Manipulateopensource databasesbasedonuserrequirements	**K3**
3	ImplementwebprogrammingwithPHP	**K3**
4	Integrateopensourcewebframeworksinanapplication	**K4**
5	WritedesktopandwebapplicationswithPython	**K6**

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

Unit:1	INTRODUCTIONTOOPENSOURCE	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–settingupaccount–starting,terminatingandwritingyourownSQL programs-recordselectionTechnology–workingwithstrings–DateandTime–sortingQueryresults– generatingsummary–workingwithmetadata–usingsequences–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 receivingE-mails – debuggingand 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-packagesandmodules–workingwithfiles–datamanipulation.		
Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars–webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	TheLinuxKernelBook,RemyCard,EricandFrankMevel,WileyPublications2003.
2	MySQLBible,SteveSuchring,JohnWiley2002.

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,2nd Edn,SteveHolzner,TMH2009.

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	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		Studentsshouldhavethebasicunderstandingof logicalcircuitsandhardwarearchitecture.	Syllabus Version		2023-24 Onward	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Tolearntheconceptsof IoTanditsprotocols.
2. TolearnhowtoanalysisthedatainIoT.
3. TodevelopIoTinfrastructureforpopularapplications.
4. ToreportabouttheIoTprivacy,securityandvulnerabilitiessolution

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	TounderstandthefundamentalsofInternetofThings.	**K1**
2	Toknowthebasicsofcommunicationprotocolsandthedesigningprinciplesof Webconnectivity.	**K2**
3	Togaintheknowledgeof Internet connectivityprinciples	**K2-K3**
4	Designinganddevelopsmartcity inIoT	**K2-K3**
5	Analyzingandevaluatethedatareceivedthrough sensorsin IOT.	**K4-K5**

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

Unit:1	INTRODUCTION	15hours

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

Unit:2	IOTand M2M	12hours

IoTandM2M-DeferencebetweenIotandM2M-SDNandNFVforlot-IoTsystemsmanagement-SNMP -YANG-NETOPEER

Unit:3	IOTSPECIFICATION	15hours

IoTplatformsdesignMethodology-purposeandspecification-processspecification-Domainmodelspecification-Informationmodelspecification-Servicespecification-IoTlevelspecification- functionalview specification-operationalview specification- Device andcomponentIntegrators -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 onRaspberry Pi -RaspberryPi interfaces.

Unit:5	IOTANDCLOUDCOMPUTING	15hours

IoT physicalservers &cloudcomputing-WAMP-XivelycloudforIoT-pythonWebapplicationframework -Amazon web services forIoT.

Unit:6	**ContemporaryIssues**	**3hours**
Expertlectures,onlineseminars–webinars		
	TotalLecturehours	**75hours**

TextBook(s)	
1	InternetofThings- AhandsonApproachAuthors:ArshdeepBahga,VijayMadisetti Publisher:Universitiespress.
ReferenceBooks	
1	InternetofThings- SrinivasaK.G.,SiddeshG.M.HanumanthaRajuR.Publisher:CengageLearningIndiapvt. 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 – SoftwareTesting**	**L**	**T**	**P**	**C**
Core/Elective/Supportive		**SkillbasedSubjectLab:4**	**0**	**0**	**3**	**2**
Pre-requisite		**Basicknowledgeonsoftwareprojectdevelopmentin SDLC**	**Syllabus Version**		**2023-24 Onward**	

CourseObjectives:

Themainobjectivesofthiscourseareto:

1. Togainknowledgeaboutrecordingthetestcaseindifferentmodes.
2. TodesignandconstructthetestcasesusingTestScriptLanguage.
3. TolearnaboutGUIobjectsand bitmapobjects

ExpectedCourseOutcomes:

Onthesuccessfulcompletionofthecourse,studentwillbeableto:

1	Understandtheimportanceofsoftwarequality/softwaretestingandapply softwaretestingtechniquesforinformationsystemsdevelopment.	**K1**
2	Generatetestcasesfrom softwarerequirementsusingvarioustestprocesses forcontinuousquality improvement.	**K2**
3	Understandflowgraphsandapplypathtesting.	**K3**
4	Apply software testing techniques in commercial environments and assess theadequacyoftestsuitesusingcontrolflow,dataflowandprogrammutation.	**K4**
5	Identifytheinputsanddeliverablesofthetestingprocessandworktogetherasa teaminpreparingareport	**K6**

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

Programs	**36hours**

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

1. ListofTestDescriptions(atleast10)fortheProgram.(20%)
2. TestCases(40%)
3. Programwithalltestcaseresultssuccess(30%)
4. Record(10%)

TESTCASEEXAMPLE:

Test-Id	TestDescription	TestSteps	Expected Output	Actual Output	Status
TC-01	Acceptanceof10digitinput data	Input 10 DigitNumber	Accepting 10digitnumber	Accepted 10 digit number	Success
TC-02	Non-acceptanceof characterdata	Inputa characterdataX	CharacterX should not beaccepted	Accepting Character data	Failure

ModifyPICX(10)intoPIC9(10)andthen runprogramforTest-idTC-02again

Test-Id	TestDescription	TestSteps	Expected Output	Actual Output	Status
TC-02	Non-acceptanceof characterdata	Inputa characterdataX	CharacterX should not beaccepted	Character data notaccepted	Success
TC-03	Digitsum of10 digit is in singledigit	Outputdata	Singledigitsum	Single digitSum	Success

1.TesttheCprogram: Findingthesum ofindividual digitsofa10-digitnumberuntilasingle digitisproduced.
2. Test the C Program: Accept the inputs student name, marks in five subjects and declare theresultasPASSif the studentgetsminimum40ineachsubject;otherwisedeclare the resultasFAIL.
3.TesttheCprogram:Programforgeneratingnprimenumbers
4.TesttheCprogram:Sortandstoretheelementsoftwoarraysofintegersintothethirdlist.
5.TesttheCprogram:Experimenttheoperationsofastackusingarrayimplementation.
6.TesttheCprogram:Menu-drivenoptionforqueueoperationslikeadd,removeanddisplay.
7.TesttheC++program:Palindromestringcheckingprogram(usingpointers)

	TotalLecturehours	**36hours**

TextBook(s)	
1	

ReferenceBooks	
1	

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	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