NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

M.C.A

Course Structure

&

Syllabus

(2020-21 academic year)

(NECR M.C.A 20)

(w.e.f AY: 2020 – 21)

NARAYANA

ENGINEERING COLLEGE

NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

VISION

- To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for Technological and Socio-economic Development of the Nation.

MISSION

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.

- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.

- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

NARAYANA ENGINEERING COLLEGE::NELLORE

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DEPARTMENT OF MCA

Course Structure for MCA w.e.f AY: 2020 – 21

SEMESTER I

Subject Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
20MC101	PC	Mathematical Foundations of Computer Science	3	0	0	3	**3**	**40**	**60**	**100**
20MC102	PC	Programming in C & Data Structures	3	1	0	4	**4**	**40**	**60**	**100**
20MC103	PC	Database Management Systems	3	0	0	3	**3**	**40**	**60**	**100**
20MC104	PC	Operating Systems	3	0	0	3	**3**	**40**	**60**	**100**
20MC105	PC	Computer Organization	3	0	0	3	**3**	40	60	100
20MC106	HS	Communication Skills Lab	0	1	2	3	**2**	40	60	100
20MC107	PC	Programming in C & Data Structures Lab	0	0	4	4	**2**	40	60	100
20MC108	PC	Database Management Systems Lab	0	0	3	3	**1.5**	40	60	100
20MC109	PC	Operating Systems Lab	0	0	3	3	**1.5**	40	60	100
20MC110	EEC	Career Competency Development Program - I	0	0	2	2	**1**	40	60	100
		Activity Point Programme	During the Semester					20 Points		
		Total	**15**	**2**	**14**	**31**	**24**	**400**	**600**	**1000**

SEMESTER II

Subject Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
20MC201	PC	Object Oriented Programming through Java	3	0	0	3	**3**	**40**	**60**	**100**
20MC202	PC	Python Programming	3	0	0	3	**3**	**40**	**60**	**100**
20MC203	PC	Artificial Intelligence	3	0	0	3	**3**	**40**	**60**	**100**
20MC204	PC	Software Engineering	3	0	0	3	**3**	**40**	**60**	**100**
-	PE	Professional Elective – I	3	0	0	3	**3**	40	60	100
-	PE	Professional Elective - II	3	0	0	3	**3**	40	60	100
20MC205	PC	Object Oriented Programming through Java Lab	0	0	4	4	**2**	40	60	100
20MC206	PC	Python Programming Lab	0	0	3	3	**1.5**	40	60	100
20MC207	PC	Artificial Intelligence Lab	0	0	3	3	**1.5**	40	60	100
20MC208	EEC	Career Competency Development Program - II	0	0	2	2	**1**	40	60	100
20MC209	EEC	Value Added Course/ Certificate Course - I	0	0	0	0	**1**	40	60	100
		Activity Point Programme	During the Semester					20 Points		
		Total	**18**	**0**	**12**	**30**	**25**	**440**	**660**	**1100**

SEMESTER III

Subject Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
20MC301	PC	Computer Networks	3	0	0	3	**3**	**40**	**60**	**100**
20MC302	PC	Design and analysis of Algorithms	3	0	0	3	**3**	**40**	**60**	**100**
20MC303	PC	Web Technologies	3	0	0	3	**3**	**40**	**60**	**100**
-	PE	Professional Elective - III	3	0	0	3	**3**	**40**	**60**	**100**
-	PE	Professional Elective - IV	3	0	0	3	**3**	40	60	100
-	PE	Professional Elective - V	3	0	0	3	**3**	40	60	100
20MC304	PC	Computer Networks Lab	0	0	3	3	**1.5**	40	60	100
20MC305	PC	Design and analysis of Algorithms Lab	0	0	3	3	**1.5**	40	60	100
20MC306	PC	Web technologies Lab	0	0	4	4	**2**	40	60	100
20MC307	EEC	Career Competency Development Program - 3	0	0	2	2	**1**	40	60	100
20MC308	EEC	Value added Course/ Certificate Course - 2	0	0	0	0	**1**	40	60	100
		Activity Point Programme	During the Semester					20 Points		
		Total	**18**	**0**	**12**	**30**	**25**	**440**	**660**	**1100**

SEMESTER IV

Subject Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
20MC401	PR	Project	-	-	-	-	16	60	140	200
20MC402	PR	Comprehensive Viva Voce	-	-	-	-	2	40	60	100
		Activity Point Programme	During the Semester					20 Points		
		Total	0	0	0	0	18	100	200	300

Professional Elective – I

Syllabus for I Year II Semester Professional Elective Subjects:

1. MAD with Android – 20MC210
2. Cloud Computing - 20MC211
3. Distributed Computing - 20MC212
4. Information Retrieval Systems - 20MC213
5. Object Oriented Analysis and Design - 20MC214

Professional Elective – II

Syllabus for I Year II Semester Professional Elective Subjects:

1. Linux Programming - 20MC215
2. Cryptography & Network Security - 20MC216
3. Grid Computing - 20MC217
4. Big Data Analytics - 20MC218
5. Software Project Management - 20MC219

Professional Elective – III

Syllabus for II Year I Semester Professional Elective Subjects:

1. Cyber Security - 20MC309
2. High Performance Computing - 20MC310
3. Machine Learning - 20MC311
4. PHP - 20MC312
5. Software Architecture - 20MC313

Professional Elective – IV

Syllabus for II Year I Semester Professional Elective Subjects:

1. Data Science - 20MC314
2. IoT - 20MC315
3. Soft Computing - 20MC316
4. Natural Language Processing - 20MC317
5. Software Quality Assurance - 20MC318

Professional Elective – V

Syllabus for II Year I Semester Professional Elective Subjects:

1. Research Methodologies - 20MC319
2. Block Chain Technologies - 20MC320
3. Edge Computing - 20MC321
4. Deep Learning - 20MC322
5. Software Testing - 20MC323

HUMANITIES AND SOCIAL SCIENCES (HS)

SEMESTER	SUBJECT CODE	SUBJECT	CREDITS
I	20MC106	Communication skills Lab	2
		TOTAL	**2**

PROFESSIONAL CORE (PC)

SEMESTER	SUBJECT CODE	SUBJECT	CREDITS
I	20MC101	Mathematical Foundations of Computer Science	3
	20MC102	Programming in C & Data Structures	4
	20MC103	Database Management Systems	3
	20MC104	Operating Systems	3
	20MC105	Computer Organization	3
	20MC107	Programming in C & Data Structure Lab	2
	20MC108	Database Management System Lab	1.5
	20MC109	Operating Systems Lab	1.5
		Total	**21**
II	20MC201	Object Oriented Programming through Java	3
	20MC202	Python Programming	3
	20MC203	Artificial Intelligence	3
	20MC204	Software Engineering	3
	20MC205	Object Oriented Programming through Java Lab	2
	20MC206	Python programming Lab	1.5
	20MC207	Artificial Intelligence Lab	1.5
		Total	**17**
III	20MC301	Computer Networks	3
	20MC302	Design and Analysis of Algorithms	3
	20MC303	Web Technologies	3
	20MC304	Computer Networks Lab	1.5
	20MC305	Design and Analysis of Algorithms Lab	1.5
	20MC306	Web Technologies Lab	2
		Total	**14**
		TOTAL	**52**

Professional Core: Theory Subjects: 12 labs: 09

PROFESSIONAL ELECTIVES (PE)

SEMESTER	SUBJECT	CREDITS
II Sem	Professional Elective 1	3
	Professional Elective 2	3
III Sem	Professional Elective 3	3
	Professional Elective 4	3
	Professional Elective 5	3
	TOTAL	**15**

PROJECT (PR)

SEMESTER	SUBJECT CODE	SUBJECT	CREDITS
IV Sem	20MC401	Project	16
	20MC402	Comprehensive Viva – Voce	02
		TOTAL	**18**

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SEMESTER	SUBJECT CODE	SUBJECT	CREDITS
I Sem	20MC110	Career Competency Development Program – I	**1**
II Sem	20MC208	Value added course/Certificate course I	**1**
	20MC209	Career Competency Development Program – II	**1**
III Sem	20MC307	Value added course/Certificate course II	**1**
	20MC308	Career Competency Development Program - III	**1**
		TOTAL	**5**

OVERALL CREDITS

SL NO	SUBJECT AREA	CREDITS PER SEMESTER				CREDITS
		I	II	III	IV	
1	HS	2	--	--	--	**02**
2	PC	21	17	14	--	**52**
3	PE	--	6	9	--	**15**
4	EEC	1	2	2	--	**05**
5	PR	--	--	--	18	**18**
TOTAL		**24**	**25**	**25**	**18**	**92**

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC101	MATHEMATICALFOUNDATIONSOFCOMPUTERSCIENCE							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite:SetTheory

CourseObjectives:

- Introducetheconceptsoflogic,rulesofinferenceandpredicates.
- ConceptsofSetTheory,Relations&Functionswillbeexplained.
- Providesanillustrationofproblemsingraphtheory.
- ExplaintheconceptsofAlgebraicStructures
- Understandabout theelementaryCombinatorics
- AnalyzeandsolveRecurrenceRelations

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Evaluateelementarymathematicalargumentsandidentifyfallaciousreasoning**.(BL-5)**
CO2	Uselogicalnotationtodefineandreasonaboutfundamentalmathematicalconceptssuchassets,relations andfunctions**.(BL-3)**
CO3	Apply graph theorymodelsofdatastructuresand state machinesto solve problemsofconnectivityandconstraintsatisfaction**.(BL-4)**
CO4	SynthesizeconceptsofAlgebraicStructures**.(BL-5)**
CO5	BecomefamiliarwithelementaryCombinatoricsanddifferenttheoremsofCombinatorics**.(BL-3)**
CO6	Describevarioustypesofrecurrencerelationsandthemethods tofindouttheirsolutions**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	2										3	
CO2	1	1	1	3									2	2
CO3	3	1	1										2	2
CO4	2	2	2	2									1	1
CO5	2	1	3										2	
CO6	2	3	3	2									2	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	ElementaryMathematicalLogics	8HOURS

FOUNDATIONSOFLOGIC: Introduction,truthtables,statementsandnotations,propositionallogic, Connectives,propositionalequivalence,predicateandquantifiers,Normalforms,rulesofInference.

AttheendoftheModule1,studentswillbeableto:

1. Evaluatedifferent truthtables andpropositionallogics**(BL-5)**
2. Identifypredicates,quantifiers andproperequivalences**(BL-2)**
3. Examinenormalformsandtherules ofinference**(BL-4)**

MODULE-2	FundamentalMathematicalConcepts	8HOURS

SETTHEORY: Basicsofsettheory,setoperations
RELATIONS: Relationsandtheirproperties,representingrelations,PropertiesofbinaryRelations,Equivalencerelations,LatticeanditsProperties,Partialordering,Hassediagram
FUNCTIONS: Compositionoffunctions,InverseFunction,typesof functions,RecursiveFunctions

AttheendoftheModule2,studentswillbeableto:

1. Illustratethebasicsofset theoryandset operations**(BL-2)**
2. Examinethepropertiesofrelations andordering**(BL-4)**
3. Analyzedifferentfunctions**(BL-4)**

MODULE-3	GraphTheoryModels	8HOURS

GRAPH THEORY: Graphs and graph models, graph terminology and special types of graphs, representinggraphs and graph isomorphism, connectivity, Euler and Hamiltonian paths, shortest path problems, planargraphs,graphcoloring

TREES:Introductiontotrees,Applicationsoftrees,spanningtrees&minimumspanningtrees

AttheendoftheModule3,studentswillbeableto:

1. Modeldifferentgraphsandrepresentthem**(BL-3)**
2. Analyzeshortest pathproblemsandcolorthegraphs**(BL-4)**
3. Examinedifferenttreesandtheir applications**(BL-4)**

MODULE-4	**Algebra**	**8HOURS**

ALGEBRAICSTRUCTURES: Definition,elementarypropertiesofgroups, semigroups,monoids

AttheendoftheModule4,studentswillbeableto:

1. Understandofbasicandelementarypropertiesof Groups.**(BL-2)**
2. Different types ofgroups inMathematicalTheory**(BL-4)**
3. Identificationofdifferent groupsinmathematicalstructures**(BL-2)**

MODULE-5	**ElementaryCombinatorics**	**8HOURS**

ELEMENTARY COMBINATORICS: Basics ofcounting, Combinations and permutations,enumerationofcombinationsandPermutations,EnumeratingcombinationsandPermutationswithrepetitions,ThebinomialandMultinomialTheorems, Theprinciple of InclusionandExclusion

1. ElaboratetheknowledgeonthePermutationsandcombinations**(BL-4)**
2. IllustratethedifferentTheoremsinElementaryCombinatorics**(BL-4)**
3. UnderstandabouttheInclusionandExclusionprinciple**(BL-2)**

MODULE-6	**Recurrencerelations**	**8HOURS**

RECURRENCE RELATIONS: Generating functions of sequences, Calculating coefficients ofGeneratingFunctions, Recurrence Relations, Solving Recurrence Relations by Substitutions and Generating functions andthemethodof Characteristic Roots**.**

AttheendoftheModule5,studentswillbeableto:

1. Understandaboutthebasic usageofRecurrenceRelations**(BL-2)**
2. DevelopingsolutionsforRecurrenceRelationsbysubstitutionsmethods**(BL-5)**
3. ApplyingofRecurrenceRelationsforadvancedalgorithms**(BL-3)**

Totalhours:	**48hours**

Contentbeyondsyllabus:

1. Findingshortest routesincarnavigationsystems
2. Pathplanninginrobotics

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	PropositionalLogics	https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logic.htmhttps://www.javatpoint.com/propositions-and-compound-statements
2	Sets,Relations andFunctions	https://www.javatpoint.com/sets-introduction https://www.tutorialspoint.com/discrete_mathematics/discretemathematics_relations.htm
3	GraphTheory	https://www.javatpoint.com/introduction-of-graphs https://www.tutorialspoint.com/graph_theory/index.htm
4	AlgebraicStructures	https://www.javatpoint.com/discrete-mathematics-semigroup https://www.tutorialspoint.com/discrete_mathematics/booleanexpressions_functions.htm
5	ElementaryCombinatorics	https://www.javatpoint.com/permutation-and-combinations https://www.javatpoint.com/inclusion-exclusion-principle
6	RecurrenceRelations	https://www.javatpoint.com/recurrence-relationshttps://www.javatpoint.com/generating-functions

TextBook(s):

1. Kenneth H. Rosen, “Discrete Mathematics and its Applications,” Tata McGraw Hill, NewDelhi,7thedition,2017.
2. TremblyJ.P.andManohar.P,“DiscreteMathematicalStructureswithapplicationstocomputerscience,” TataMcGrawHill,NewDelhi,2017.
3. J.L.Mott,A.Kandel,T.PBaker,“DiscreteMathematicsfor Computer Scientistsand Mathematicians,”PrenticeHallIndia,2ndEdition2015.

ReferenceBook(s):

1. D. S. Chandrasekharaiah, *"Mathematical Foundations of computer science (DiscreteStructures),"*PrismBooksPvt.Ltd,India,2006.
2. JohnsonBaughR,andCarmanR,Discretemathematics,5thedition,PersonEducation,2003.
3. KolmanB,BusoyR.C,andRossS.C,DiscreteMathematicalStructures,5thedition,Pretitice–Hall,2004.

Online/WebResources:

1. http://discrete.openmathbooks.org/pdfs/dmoi3-tablet.pdf
2. https://www.freetechbooks.com/discrete-mathematics-f65.html
3. https://idoc.pub/documents/discrete-mathematical-structures-with-applications-to computer-science-by- jp-tremblay-r-manoharpdf-ylyxmp1z1enm

4.4.https://nptel.ac.in/courses/106/106/106106094/

5. https://www.javatpoint.com/discrete-mathematics-tutorial
6. https://youtu.be/rdXw7Ps9vxc
7. https://www.tutorialspoint.com/discrete_mathematics/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC102	Programmingin‘C’andDataStructures							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	1	0	60	4	40	60	100

Pre-requisite: BasicconceptofProgrammingand problemsolvingskills

CourseObjectives:

- TounderstandthevariousstepsinProgramdevelopment.
- TounderstandthebasicconceptsinCProgrammingLanguage.
- Tolearnhowtowrite modular andreadableCPrograms.
- Tolearntowriteprograms(usingstructuredprogrammingapproach)inCtosolveproblems.
- Tounderstandthebasicstructureconceptsuchas AbstractDataTypes,LinearandNonLinearDatastructures.
- Tounderstandthenotationsusedtoanalyzethe Performanceofalgorithms.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandthebasicterminologyusedincomputerprogramming**(BL-2)**
CO2	Developprogramsincontrolstatements**(BL-3)**
CO3	Understandtheconcepts ofarraysandFunctions**(BL-2)**
CO4	Constructtheprogramsonsortingand searching**(BL-3)**
CO5	Understandstacks andQueues concepts**(BL-2)**
CO6	Understandvarioustypesof linkedlists**(BL-2)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3		3	2	3								2	
CO2	2	2	3	2	3								1	1
CO3	2	1	2	2	2								2	2
CO4	2	2	2	2	1								2	2
CO5	2	2	1	2	2								1	
CO6	2	2	2	1	1								1	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	IntroductiontoC	11HOURS

Flow charts,Problem solving methods,Sample Programs written in C. C character set, Identifiers andkeywords, Data types, Declarations, Expressions, statements and symbolic constants,getchar, putchar,scanf,printf,gets,puts,functions,#include,#define,Arithmetic,unary,logical,bit-wise,assignmentand conditionaloperators

Atthe endof theModule1,studentswillbeableto:

1. UnderstandProblemsolving methods**.(BL-2)**
2. LearntodesigntheFlowchartsforaprogram.**(BL-2)**
3. Rememberbasicsandstructuredevelopment incprogram.**(BL-1)**

MODULE-2	Controlandconditionalstatements	9 HOURS

Loopcontrolstatements: While,do-while,forstatements,nestedloops,ifelse,switch,break,Continue,andgotostatements,commaoperator.
Strings: Operations,Stringarrays,Simpleprogramswithandwithoutstringfunctions.

Atthe endof theModule2,studentswillbeableto:

1. Understandthe loopcontrolstatements construction.**(BL-2)**
2. MakeuseofconditionalstatementsinC.**(BL-3)**
3. Explainstringsandstringfunctions.**(BL-2)**

MODULE-3	**ArraysandFunctions**	**9 HOURS**

Arrays:Initialization,Declaration,Onedimensional,Two dimensionalarraysand Multidimensionalarrays,Applicationsofanarray,Matrixoperations,Searchingtechniques.
Functions: Definition,Declaration,CallbyvalueandCallbyreference, Recursion,Storageclasses.

Atthe endof theModule3,studentswillbeableto:

1. Explainhowtoconstructarraydeclaration,initializationandaccessing.**(BL-2)**
2. Basicoperationson matrices byusingarrays.**(BL-2)**
3. FunctionDeclarationsandfunctioncalling methods.**(BL-2)**

MODULE-4	**Sorting andSearching**	**9 HOURS**

Sorting:Introductionstosorting,typesofsorting BubbleSort,SelectionSort,InsertionSort,MergeSort, Radix SortandQuickSort.
Searching:Introductiontosearching,typesofsearching,LinearSearch,BinarySearch,andFibonacciSearch.

Atthe endof theModule4,studentswillbeableto:

1. Understandingimportanceofsortingandsearchingmethods.**(BL-2)**
2. Explainsortingprocessandvarious typesofsortingtechniques.**(BL-2)**
3. Explainsearchingprocessandvarious typesofsearchingtechniques.**(BL-2)**

MODULE-5	**Stacks andQueues**	**11HOURS**

Stacks:Introduction, Definition,RepresentationofStacks-ArraysandLinkedlists,Operationsonstacks,Applications of stacks-Evaluation of Arithmetic Expression, Implementation of Recursion, FactorialCalculations,Towersof Hanoi.
Queues:Introduction, Definition,RepresentationofQueues-ArraysandLinkedlists,VariousQueue structures,OperationsonQueues,Applications,Priorityqueues.

Atthe endof theModule5,studentswillbeableto:

1. UnderstandtheStackMechanismforstorageandaccesses.**(BL-2)**
2. Explainthevariousoperationsofstacksbyusingarraysand Linkedlists.**(BL-2)**
3. UnderstandthevariousoperationsofQueuesandoperationsonqueues.**(BL-2)**

MODULE-6	**LinkedLists**	**11HOURS**

Linkedlist:Definition,
OperationsonSinglelinkedlists,Doublylinkedlists,CircularlinkedlistsandCircularDoublelinkedlists.
ApplicationsofLinkedlist:SparseMatrixManipulation, PolynomialRepresentation.

Atthe endof theModule6,studentswillbeableto:

1. Tounderstandtherepresentationof LinkedLists.**(BL-2)**
2. Explainvarioustypesoflinkedlistsanditsoperations.**(BL-2)**
3. UnderstandtheSparseMatrixManipulations andpolynomials.**(BL-2)**

Totalhours:	**60HOURS**

Contentbeyondsyllabus:

1. Advancedtopicsrelatedissuesindatastructures
2. Abletoimplement thealgorithms anddrawflowcharts forsolvingMathematicalandEngineeringproblems.

Self-Study:

Contentstopromoteself-Learning:			
SNO	**Topic**	**CO**	**Reference**
1	AssignmentandConditionaloperatorsin C	CO1	https://fresh2refresh.com/c-programming/c-operators-expressions/c-conditional-operators/
2	Representationofstringsin C	CO2	https://www.tutorialspoint.com/cprogramming/c_stringm
3	Functiondeclarationandcallinginprogramming	CO3	https://www.tutorialspoint.com/cprogramming/c_functihtm
4	SortingandSearchingrepresentationinC programming language	CO4	http://www.idc-online.com/technical_references/pdfs/information_technology/Searching_and_Sorting_in_C_Programming
5	Stackanditsoperations	CO5	https://afteracademy.com/blog/stack-and-its-basic-operati
6	Linkedlist representationsin‘C’	CO6	https://www.tutorialspoint.com/data_structures_algorithmked_list_program_in_c.htm

TextBook(s):

1. AStructuredProgrammingApproachUsingC,B.A.ForouzanandR.F.Gilberg,ThirdEdition,Cengage Learning.
2. ‘ProgramminginCandDataStructures’,J.R.Hanly,AshokN.Kamthane,A.AnandaRao,PearsonEducation.

ReferenceBook(s):

1. C&Datastructures –P.Padmanabham,ThirdEdition,B.S.Publications.
2. ProblemSolvingandProgramDesigninC,J.R.Hanly andE.B.Koffman,7thEdition,Pearsoneducation.
3. ProgramminginC –StephenG. Kochan,IIIEdition,PearsonEductaion.

OnlineResources:

1. https://www.youtube.com/watch?v=11i8bRojtYk
2. https://www.geeksforgeeks.org/data-structures/
3. https://www.programiz.com/dsa
4. https://www.youtube.com/playlist?list=PLBlnK6fEyqRhX6r2uhhlubuF5QextdCSM&app=desktop
5. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC103	DATABASEMANAGEMENTSYSTEMS							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite:CProgramming

CourseObjectives:

- TounderstandthebasicconceptsandRelationalDatabaseDesignofDatabasesystems.
- Tomasterthebasics ofSQL andconstructqueries usingSQL.
- AdequateknowledgetoperformNormalizationonthe DatabaseTables
- To become familiar with the basic issues and concepts of Transaction Processing and ConcurrencyControl.
- TobecomefamiliarwithDatabaseRecovery methods
- Tounderstandtheconcepts ofIndexingand differenttypes ofIndexing

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	DemonstratethebasicelementsofaRelationalDatabaseManagementSystem**(BL-3)**
CO2	Analyze& DesignEntityRelationshipandconvert Entity-RelationshipDiagramsintoRDBMSandformulateSQLqueriesontherespectdata.**(BL-4)**
CO3	ApplyNormalizationandIntegrityKeysforthedevelopment ofApplicationSoftware**(BL-3)**
CO4	UnderstandabouttheTransactionsandConcurrencyControl**(BL-2)**
CO5	UnderstandabouttheRecoverySysteminDatabases**(BL-2)**
CO6	Utilizeand implementation ofconceptIndexing inDBMS**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	1	2	1										1	2
CO2	2	1	2										2	2
CO3	3	3	2										2	2
CO4	2	2	1	3									1	1
CO5	3	1	3		2								2	
CO6	3	2	3		2								2	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	IntroductiontoDBMS	8HOURS

Introduction to file and database systems: Differences between files and databases, Database systemstructure,datamodels,introductiontonetworkandhierarchicalmodels,ERmodelanditsRepresentations. ERdiagrams,BeyondERDesign,Entities,AttributesandEntitysets,Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ERModel
RelationalModel: IntroductiontotheRelationalModel-IntegrityConstraintsoverRelations, EnforcingIntegrityconstraints,Queryingrelationaldata,Logical databaseDesign

Atthe endof theModule1,studentswillbeableto:

1. UnderstandtheNecessity&ImportanceofDatabase**(BL-2)**
2. DescribeaboutthedifferentDatamodelsinDBMS**(BL-2)**
3. ImplementofRelationalmodelandER model**(BL-3)**

MODULE-2	RelationalAlgebra&SQL	9HOURS
Relationalalgebraandcalculus: Relationalalgebra,selectionandprojection,setoperations,renaming, joins, division, Examples of algebra queries, Tuple relational calculus, Domain RelationalCalculus **Form of Basic SQL Query** - Examples of Basic SQL Queries, Formation of DDL, DML, DCLqueries,IntroductiontoViewsdestroying/AlteringTablesandViews,AggregateOperators,Triggers andActiveDatabases.		
Atthe endof theModule2,studentswillbeableto: **1.** ApplyJoinsonRelationalalgebra**(BL-3)** **2.** ConstructSQLQueryandretrievingdatafromDatabase**(BL-2)** **3.** ContrastIntegritykeysinSQL**(BL-4)**		
MODULE-3	**Normalization**	**7HOURS**
Queriesin SQL:IntroductiontoSchemaRefinement,views,Integrityandsecurity,Relationaldatabasedesign,Problems CausedbyRedundancy,Decompositions,DifferentFunctionaldependenciesandNormalizationforRelation alDatabases,1NF,2NF,3NF,BCNF,Multivalued Dependenciesand4NF,JoinDependenciesand5NF,Denormalization.		
Atthe endof theModule3,studentswillbeableto: **1.** Understandrelationaldatabasedesign**(BL-2)** **2.** IdentifydifferentFunctionalDependenciesinDatabases**(BL-3)** **3.** ApplyNormalizationonRelationalDatabases**(BL-3)**		
MODULE-4	**TransactionProcessing&Concurrencycontrol**	**8HOURS**
Transaction processing:Introduction,DifferenttypesofTransactionsNeedforConcurrencyControl,desirableproperties ofTransaction,ScheduleandRecoverability,SerializabilityandSchedules. **Concurrencycontrol**:Typesoflocks,Twophaseoflocking,deadlock,timestampbasedconcurrencycontrol,re coverytechniques,concepts,immediateupdate,deferredupdate.		
Atthe endof theModule4,studentswillbeableto: **1.** UnderstandTransactionsprocessingindatabases**(BL-1)** **2.** ExplainLocksondatabases**(BL-2)** **3.** Classifyconcurrencycontrolindatabases**(BL-2)**		
MODULE-5	**RecoverySystemandIndexing**	**8HOURS**
Recovery System-Failure Classification-Storage Structure-Recovery and Atomicity - Log - BasedRecovery - Recovery with Concurrent Transactions - Buffer Management - Failure with loss of non-volatilestorage-AdvanceRecoverysystems-Remote Backupsystems. **OverviewofStorageandIndexing**:DataonExternalStorage,FileOrganizationandIndexing- Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, TreebasedIndexing,Comparisonof FileOrganizations.		
Atthe endof theModule5,studentswillbeableto: **1.** Understanddifferenttypesofindexingmechanisms**(BL-2)** **2.** UnderstanddifferentDatarecoverymethods**(BL-2)** **3.** Applyrecoverymethodsondatabases**(BL-2)**		
MODULE-6	**IndexinginDBMS**	**8 HOURS**
Tree Structured Index: Introduction fortree indexes,Indexed SequentialAccessMethods(ISAM)B+Trees:ADynamic IndexStructure,Search,Insert,Delete. **HashBasedIndexing**:StaticHashing,Extendablehashing,LinearHashing,Extendiblevs.LinearHashing.		

Atthe endof theModule6,studentswillbeableto: **1.** UnderstandDifferenttypesofhashing**(BL-1)** **2.** LearnImportanceofISAMmethod**(BL-1)**	
3.DifferentiateextendibleVs linearhashing**(BL-2)**	
Totalhours:	**48hours**

Contentbeyondsyllabus:

1. CharacteristicsofDatabasesanddifferencebetweenfilesandDatabases,
2. PL/SQLCursors,PL/SQLLoopingstatements
3. MultipleGranularity

Self-Study:

ContentstopromoteSelf-Learning:

S.No	Module	Reference
1	Introductionto DBMS	https://beginnersbook.com/2015/04/relational-model-in-dbms/ https://www.guru99.com/relational-data-model-dbms.html
2	RelationalAlgebra &SQL	https://www.javatpoint.com/dbms-notation-of-er-diagram https://www.guru99.com/er-diagram-tutorial-dbms.html
3	Normalization	https://www.guru99.com/sql.html https://www.javatpoint.com/dbms-sql-command
4	TransactionP rocessing& Concurrencycontrol	https://www.javatpoint.com/dbms-first-normal-formhttps://www.studytonight.com/dbms/database-normalization.php
5	RecoverySystemand Indexing	https://www.tutorialspoint.com/dbms/dbms_transaction.htm https://www.guru99.com/dbms-transaction-management.html
6	IndexinginDBMS	https://www.tutorialspoint.com/dbms/dbms_indexing.htm https://www.javatpoint.com/indexing-in-dbms

TextBook(s):

1. A.Silberschatz, H.F.Korth,S.Sudarshan,"*DatabaseSystemConcepts*,"McGrawhill, 6thEdition,2011
2. RaghuRama krishnan, "DatabaseManagementSystem",TataMcGraw-HillPublishingCompany,3rdEdition,2003

ReferenceBook(s):

1. RamezElmasri,ShamkantB.Navathe,"FundamentalDatabaseSystems",PearsonEducation,3rdEdition,2003.
2. Peter Rob, Corlos Coronel, "Data base System, Design, Implementation and Management",ThompsonLearningCourseTechnology,5thEdition,2003.
3. C.J.Date, "*IntroductiontoDatabaseSystems*,"PearsonEducation, 8thEdition,2006.
4. HectorGarciaMolina,JeffreyD.Ullman,JenniferWidom,"Database SystemImplementation",PearsonEducation,UnitedStates,1st Edition,2000.

Online/WebResources:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re
3. https://www.youtube.com/results?search_query=DBMS+onluine+classes
4. http://www.w3schools.in/dbms/
5. https://www.digimat.in/nptel/courses/video/106105175/L01.html
6. .http://beginnersbook.com/2015/04/dbms-tutorial/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC104	OPERATINGSYSTEMS							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

- Tounderstandthebasiccomponents ofacomputeroperatingsystem,andtheinteractionsamongtheprocesses.
- Tounderstandmultithreadedmodel,CPUschedulingalgorithm.
- Tounderstandcriticalsectionproblem,deadlockhandlingmethods.
- Tounderstandthememorymanagement strategies andpagereplacement algorithms.
- Tounderstandthesecondarymemorystrategiesandfilesystemimplementation.
- Tounderstandtheprotectionandsecurityofsystem.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	IdentifyInterProcessCommunication(IPC)anddescribetheOSconcepts**.(BL-1)**
CO2	AnalyzeCPUschedulingalgorithms**.(BL-4)**
CO3	ApplyDeadlockhandling mechanisms,Synchronizationtools**.(BL-4)**
CO4	ExecutePageReplacementalgorithmstointerpretandresolveoptimalresourceallocation problems**.(BL-3)**
CO5	Analyzesecondarystoragealgorithms**.(BL-4)**
CO6	Analyzesystemsecurityandprotection**.(BL-4)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	2										1	2
CO2	2	3	1		1								2	1
CO3	2	3	2										2	1
CO4	3	1	2		1								1	2
CO5	3	2	1										1	2
CO6	2	3	3										2	1

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	Operatingsystemconcepts	8HOURS

System Structures: OperatingSystem concepts,Role ofOperatingSystem,OperatingSystemservices, user operating system interface, Operating System Operations, Computing Environments,Operating system structure, System calls, types of system calls, System programs, Virtual machines.**Processes:**Processconcept,Processscheduling,Operationsonprocesses,Interprocess communication(IPC), ExamplesofIPCsystems.

Atthe endof theModule1,studentswillbeableto:

1. UnderstandingtheroleofOperatingsystem. **(BL-2)**
2. Describeinterprocesscommunication.**(BL-2)**
3. Identifyscheduling mechanisms.**(BL-3)**

MODULE-2	Multithreadedprogrammingandprocessscheduling	8HOURS

MultithreadedProgramming:Multithreadedmodels,Threadlibraries,ThreadingIssues,OperatingSystemExamples. **ProcessScheduling**:BasicConcepts,TypeofScheduler,SchedulingCriteria,SchedulingAlgorithms,Multiple-ProcessorScheduling.		
Atthe endof theModule2,studentswillbeableto: **1.** Identifythreadingissues.**(BL-3)** **2.** AnalyzeandapplytheCPUschedulingalgorithms.**(BL-4)** **3.** IdentifyTypesofschedulers.**(BL-3)**		
MODULE-3	**ProcesssynchronizationandDeadlocks**	**8HOURS**
ProcessSynchronization:Concepts,Critical-Sectionproblem,Peterson'sSolution,Synchronizationhardware,Semaphores,ClassicproblemsofSynchronization,Criticalregions,Monitors. **Deadlocks**: System model, Deadlock characterization, Methods for handling deadlocks, Deadlockprevention,Deadlockavoidance,Deadlockdetection,RecoveryfromDeadlock.		
Atthe endof theModule3,studentswillbeableto: **1.** Distinguishthesolutionstothecriticalsectionproblem.**(BL-3)** **2.** AnalyzeandImplementdeadlockhandlingmethods.**(BL-4)** **3.** AnalyzeandapplyBankersalgorithm.**(BL-4)**		
MODULE-4	**Memorymanagement**	**8HOURS**
MemoryManagementstrategies: Concepts,Swapping,Contiguousmemoryallocation,Paging,Structureofpagetable,Segmentation. **VirtualMemoryManagement:**Concepts,Demandpaging,Copyonwrite,Page replacement,Allocationof frames,Thrashing.		
Atthe endof theModule4,studentswillbeableto: **1.** Understandthepagingconcepts.**(BL-2)** **2.** Distinguishpagingandsegmentation.**(BL-3)** **3.** Understandpagereplacementalgorithms.**(BL-2)**		
MODULE-5	**Secondarystoragemanagement**	**8HOURS**
Mass-storagestructure: OverviewofMass-storagestructure,Disk structure,Disk attachment,Diskscheduling,Swap-spacemanagement,RAIDstructure,Stable-storageimplementation. **FilesystemImplementation**:File-systemstructure,File-systemImplementation,DirectoryImplementation,AllocationMethods,Free-Space management.		
Atthe endof theModule5,studentswillbeableto: **1.** Explainsecondarystoragealgorithms.**(BL-3)** **2.** Identifythefileallocationmethods.**(BL-3)** **3.** ImplementtheFile-systemstructure.**(BL-3)**		
MODULE-6	**Systemprotectionandsecurity**	**8HOURS**
SystemProtection: GoalsofProtection,PrinciplesofProtection,DomainofProtection,AccessMatrix,ImplementationofAccess Matrix,Access Control,RevocationofAccessRights. **SystemSecurity:**TheSecurityproblem,Programthreats,SystemandNetworkthreats.		
Atthe endof theModule6,studentswillbeableto: **1.** Analyzeandapplyaccessmatrix forsystemprotection.**(BL-4)** **2.** Analyzethesecurityproblemsandtypeofthreats.**(BL-4)** **3.** DistinguishbetweenSystemandNetworkthreats.**(BL-4)**		
	Totalhours:	**48HOURS**

Contentbeyondsyllabus:

1. Synchronization,
2. communicationandschedulinginparallelsystems,
3. Kernelbiaseddescriminantanalysis.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	Processconcepts	https://www.tutorialspoint.com/operating_system/os_processes.htm https://www.geeksforgeeks.org/introduction-of-process-management/
2	Processscheduling	https://www.tutorialspoint.com/operating_system/os_process_scheduling_algorithms.htm https://www.guru99.com/process-scheduling.html
3	Deadlock	https://www.tutorialspoint.com/Operating-System-Structure https://www.javatpoint.com/os-deadlocks-introduction
4	Virtualmemory	https://www.tutorialspoint.com/operating_system/os_virtual_memory.htm https://www.guru99.com/virtual-memory-in-operating-system.html
5	Massstoragestructure	https://www.tutorialspoint.com/what-is-british-standard-system-and-international-standard-systemhttps://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/10_MassStorage.html
6	Systemprotectionandsecurity	https://www.tutorialspoint.com/Protection-and-Security-in-Operating-System https://www.geeksforgeeks.org/system-protection-in-operating-system/

TextBook(s):

1. OperatingSystem Concepts,Abraham Silberchatz,PeterB.Galvin,GregGagne,Wiley,EightEdition,2014.
2. OperatingSystems,A.S.Godbole,SecondEdition,TMH.
3. AnIntroductiontoOperatingSystems,P.C.P.Bhatt,PHI.

ReferenceBook(s):

1. OperatingsystemsbyAKSharma,UniversitiesPress.
2. OperatingSystems,S.Haldar,A.A.Aravind,PearsonEducation.
3. ModernOperatingSystems,AndrewS Tanenbaum,SecondEdition, PHI.
4. OperatingSystems,G.Nutt,N.ChakiandS.Neogy,ThirdEdition, PearsonEducation.
5. OperatingSystems,R.Elmasri, A,G.CarrickandD.Levine, McGrawHill.
6. PrinciplesofOperatingSystems, B.L.Stuart,Cengagelearning,India Edition.
7. OperatingSystemDesgin,Douglas Comer,CRCPress,2ndEdition

OnlineResources/webreferences:

1. http://www.freebookcentre.net/CompuScience/Free-Operating-Systems-Books-Download.html
2. http://freecomputerbooks.com/compscOperatingSystemsBooks.html
3. http://www.tutorialpoint.com
4. https://www.guru99.com/virtual-memory-in-operating-system.html

5.https://nptel.ac.in/courses/106/108/106108101/

6.https://www.geeksforgeeks.org/introduction-of-process-management/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC105	COMPUTERORGANIZATION							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite:NumberSystems

CourseObjectives:

- Tounderstandbasiccomponentsofsystem.
- Tounderstand number representation.
- Tounderstandconcreterepresentationofdataatthemachinelevel
- Tounderstandthefunctioningandprogrammingofthe INTEL-8086
- Tounderstandthesysteminterconnectionandthedifferent I/O techniques.
- Tounderstandtheparallelprocessingincomputersystem.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Analyzethefunctionalunits ofacomputeroperate,interactandcommunicate**.(BL-4)**
CO2	Identifytherepresentationofnumbersandperformarithmeticoperations**.(BL-1)**
CO3	Analyzethememoryorganization ofcomputersystem**.(BL-4)**
CO4	Definealogicforassembly languageprogramming**.(BL-1)**
CO5	Interpret thefunctionalarchitectureofcomputingsystem**.(BL-2)**
CO6	Identifythedifferentarchitecturalandorganizational designissues thatcanaffect the performance of a computer such as Instruction Sets design, Pipelining, RISCarchitecture**.(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	1	2	1										1	1
CO2	3	2	1										1	2
CO3	1	3	2										1	2
CO4	3	1	2		1								2	1
CO5	2	3	1	2									1	2
CO6	2	3	1										2	1

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	BasicStructureofComputerandMachineInstructions	8HOURS

Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance,MultiprocessorsandMulticomputer,ArithmeticOperationsandPrograms,InstructionsandInstructionSequencing,AddressingModes,BasicInput/outputOperations**.**

Atthe endof theModule1,studentswillbeableto:

1. Understandthebasicfunctionalunitsandthewaystheyareinterconnectedtoformacomputersystem**.(BL-2)**
2. Illustratevariousaddressingmodesforaccessingregisterandmemoryoperands**.(BL-2)**
3. Describetheinstructionsequencingandvarioustypesof instructions**.(BL-3)**

MODULE-2	DataRepresentation	7HOURS

DataTypes,Complements,Fixed-PointRepresentation,FloatingPointRepresentation,BinaryCodes, ErrorDetectionCodes.

Atthe endof theModule2,studentswillbeableto:

1. IdentifyVariousNumbersystems**.(BL-3)**
2. Analyzethearithmeticoperation**.(BL-4)**

3.Conversion ofBinarycodes.

MODULE-3	Memory OrganizationandMicro programmedcontrol	10HOURS

Memory hierarchy, Main memory-RAM, ROM chips, Memory address map, Associative Memory-Hardware logic, match, read and write logic, Cache Memory-Associative mapping, Direct mapping,Set-associativemapping,hitandmissratio.
ControlMemory, AddressSequencing,Micro-programExample, DesignofControlUnit.

Atthe endof theModule3,studentswillbeableto:

1. Analyzetheorganizationofvarious parts ofasystemmemoryhierarchy.**(BL-4)**
2. Applybasicbinarymathoperations andmicroprogrammedcontrolincomputers.**(BL-3)**
3. AnalyzetheControlmemory.**(BL-4)**

MODULE-4	BasicCPU Organization	8HOURS

IntroductiontoCPU,Instructionformats-INTEL-8086CPUarchitecture-Addressingmodes-generation of physical address- code segment registers, Zero, one, two, and three address instructions.INTEL 8086 Assembly language instructions-Data transferinstructions-input- output instructions,addresstransfer,Flagtransfer,arithmetic,logical,shift,androtate instructions.Conditionalandunconditionaltransfer,iterationcontrol,interruptsandprocesscontrolinstructions,assemblerdirectives,Programmingwithassemblylanguageinstructions.

Atthe endof theModule4,studentswillbeableto:

1. Demonstrateprogrammingproficiencyusingvariousaddressingmodes andinstructionset. **(BL-2)**
2. Analyzearchitectureofmicroprocessor.**(BL-4)**
3. Identifythedatatransferinstructions.**(BL-3)**

MODULE-5	Input-OutputOrganization	7HOURS

PeripheralDevices,Input-OutputInterface,AsynchronousDataTransfer,ModesofTransfer,Priority Interrupt.DMA,DMAcontrol,DMAtransfer,Inputoutputprocessor-CPU-IOPcommunication.

Atthe endof theModule5,studentswillbeableto:

1. ExplainIOinterface.**(BL-2)**
2. DistinguishbetweenIOPandCPU.**(BL-4)**
3. AnalyzetheDMAtransfer.**(BL-4)**

MODULE-6	PipelineandVectorProcessing	8HOURS

PipelineAndVectorProcessing: ParallelProcessing,Pipelining,ArithmeticPipeline,InstructionPipeline, RISCPipeline,VectorProcessing,ArrayProcessors.
MultiProcessors: CharacteristicsofMultiprocessors,InterconnectionStructures,InterprocessorArbitration,InterProcessorCommunicationandSynchronizationCacheCoherence,SharedMemory Multiprocessors.

Atthe endof theModule6,studentswillbeableto:

1. Analyzepipelineforconsistentexecutionofinstructionswithminimumhazards.**(BL-4)**
2. DescribeMultiprocessorsanditsinterconnectionstructure.**(BL-3)**
3. Analyzethecachecoherence.**(BL-4)**

Totalhours:	48HOURS

Self-Study:
Contentstopromoteself-Learning:

SNO	Module	Reference
1	BasicStructureof ComputerandMachineInstructions	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
2	Datarepresentation	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/https://www3.ntu.edu.sg/home/ehchua/programming/java/datarepre entation.html

3	Memoryorganization	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/ https://www.studytonight.com/computer-architecture/memory-organization	
4	8086organization	https://www.javatpoint.com/8086-microprocessor https://www.geeksforgeeks.org/memory-segmentation-8086-microprocessor/	
5	IOorganization	https://www.geeksforgeeks.org/io-interface-interrupt-dma-mode/ https://www.studytonight.com/computer-architecture/input-output-organisation	
6	Pipelineandvectorprocessing	https://www.studytonight.com/computer-architecture/vector-and-superscalar https://www.geeksforgeeks.org/vector-processor-classification/	

TextBook(s):

1. ComputerSystemArchitecture,M.MorrisMano, 3rdEdition, PearsonEducation,2008.
2. MicroprocessorsandInterfacing, DouglasHall,TataMcGraw-Hill.

ReferenceBook(s):

1. ComputerOrganization,CarlHamacher,ZvonkoVranesic,SafwatZaky,VthEdition,McGrawHill.
2. FundamentalsofComputer OrganizationandDesign,Sivarama P.Dandamudi,Springer Int.Edition.
3. DigitalDesign, M.MorrisMano, PearsonEducation.
4. Computer OrganizationandDesign,D.A.PatersonandJohnL.Hennessy,Elsevier. Computer
5. ArchitectureandOrganization,M.MurdoccaandV.Heuring,WileyInda.
6. ComputerOrganizationandArchitecture,WilliamStallings,8thEdition,Pearson,2007.

Onlineresources/WebReferences:

1. www.frortechbooks.com/computer-organization-and-architectureref56.com
2. https://www.pdfdrive.com/computer-organization-books.html
3. https://www.tutorialspoint.com/computer_organization/index.asp
4. https://www.geeksforgeeks.org/computer-organization-and-architecturetutorials/ https://nptel.ac.in/courses/106/105/106105163/
5. https://www.javatpoint.com/computer-organization-and-architecture-tutorial

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC106	COMMUNICATIONSKILLSLAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	1	2	48	2	40	60	100

Pre-requisite: BasicknowledgeofEnglish

CourseObjectives:

1. TohoneCommunicationSkillsbygivingadequateexposureinreading,writing,listeningandspeaking
2. Tohelp learnerstoacquireproficiency,bothinspokenandwrittencommunication.
3. Tobuildupthelearnersconfidencethroughinterpersonalcommunicationbyreinforcingthebasicsofpronunciation.
4. Tohelpthelearnerstoacquirebehavioralskills(Timemanagement,Stressmanagementand Positivethinking)

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	understandanddemonstratecommunicationskillsthroughinvention,organization, drafting,revision,editing,andpresentation.(BL2)
CO2	Usethephoneticsforeffectiveoralcommunication..(BL3)
CO3	understandthevalueoflisteningtoidentifythethreeattributesofactivelistenersand torecognizebarrierstoeffectivelistening.(BL2)
CO4	Developtheadequatespeakingskillstocommunicateprofessionally.(BL3)

CO-POMapping

	PO												PSO	
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
CO1	1	3	3		1				1			2	2	2
CO2	2	3	3		1				1			3	3	2
CO3	1	3	3	1	1				1			3	3	2
CO4	2	2	3	1	1				2		2	3	3	2

1:Low,2-Medium, 3-High

COURSECONTENT		CO
Task1		
ClassRoom:	Introduction–Objectives& CharacteristicsofTechnical Communication–Importance andneedforTechnicalcommunication	CO1
Activity:	Ice - Breaking Activity, Introducing Oneself and Others – Greetings – TakingLeave	
Task- 2		
ClassRoom:	Verbal&NonVerbalCommunication-InterpersonalCommunicationin/withGroups	CO1
Activity:	RolePlays/Mime/Skit/Just aMinute	
Task-3		
ClassRoom:	Barrierstoeffectivecommunication-Kinesics,Proxemics,Paralanguage,Haptics,Chronemics.	CO2
Activity:	ConversationPractice–GivingDirections-OralDescriptionofPictures, Photographs,Products,andProcess	
TASK-4		

ClassRoom: Activity:	ListeningSkills-TypesofListeningSkills-Active listeningand anticipatingthespeaker ListeningforSpecific&GeneralDetails- ListeningComprehension	CO2
	TASK-5	
ClassRoom: Activity:	ReadingSkills-Skimming,Scanning,Intensive &Extensivereading WhatisDebate,HowtoDebate,TipsforDebate,DebatePractice,Explanationof Debate Techniques,Debate VideosPresentation	CO3
	TASK-6	
ClassRoom: Activity:	ScientificandTechnicalwriting;FormalandInformalwriting–Abstract Writing–TechnicalReportWriting WhatisGroupDiscussion,TypesofGroupDiscussion,TipsandTechniquesforEffectiveGroupDiscussion,GroupDiscussionVideos Presentation.	CO3
	TASK-7	
Class Room: Activity:	Presentation Skills Presentation techniques-tips of how to be an effectivepresenter-Preparation — 1) how to deal with fear and anxiety 2) Voice,paceandgesture— howtospeak,standandmove.3)Gettinglivefeedback—howtointeractwiththe audience PracticalsessiononTechnicalPresentations	CO4
	TASK-8	
ClassRoom: Activity:	ResumeWriting, ResumeCoverLetter, CurriculumVitaePreparation InterviewSkillsIntroduction,Interviewstrategies,Interviewquestions,SuccessfulInterview presentations andMockInterviews.	CO4

TextBook(s):

1. ATextBookofEnglishPhonetics forIndianStudentsby,T.Balasubramanian, McMillan.
2. MonipallyMM,Businesscommunicationstrategies,McGrawHill

ReferenceBook(s):

1.Bovee, TillandSchatzman,BusinessCommunicationtoday,Pearson

WebResources:

1. http://www.saylor.org/books_Download
2. https://open.umn.edu/opentextbooks/textbooks/8
3. https://youtu.be/Ls723rwM-rk
4. https://youtu.be/ADJAcyTq1us
5. https://youtu.be/12Prc9ZA81w
6. https://youtu.be/FKs6mA04Dso

NARAYANAENGINEERINGCOLLEGE::GUDUR								
20MC107	Programmingin C&DataStructuresLab							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I/I	0	0	4	36	2	40	60	100
Pre-requisite:								
CourseObjectives: • Towriteprograms inCtosolvetheproblems. • Toimplementlineardatastructuressuchaslists,stacks,queues. • Toimplement simplesearchingandsortingmethods.								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Toapplytheconceptsofstructureoriented programming approaches							
CO2	Todealthelinearandnon-lineardatastructurerelatedproblems							
CO3	Tosolvetheproblemsrelatedtologicaloperations							
CO4	Tosolvethevariousmathematicaloperations							

CO-POMapping														
	PO												PSO	
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	1	3	3		1				1			2	2	2
CO2	2	3	3		1				1			3	3	2
CO3	1	3	3	1	1				1			3	3	2
CO4	2	2	3	1	1				2		2	3	3	2
1:Low, 2-Medium,3-High														

COURSECONTENT	CO
Task1	
1. WriteaCprogramto find thesumofindividual digitsofapositiveinteger. **2.** WriteaCprogramto generatethefirstntermsofthesequence.	CO1
Task-2	
1. WriteaCprogramtocalculatethefollowingSum:Sum=1-x2/2!+x4/4!-x6/6!+x8/8!-x10/10! **2.** WriteaCprogramtofind the rootsofaquadratic equation.	CO1
Task-3	
1. WriteaCprogramtogenerateallthe primenumbersbetween1andn,wherenisavalue suppliedbytheuser. **2.** WriteaCprogram,whichtakestwointeger operandsandoneoperatorfromtheuser,performstheoperationand thenprintstheresult.(Considertheoperators+,-,*,/,%and useSwitchStatement)	CO2
TASK-4	
1. WriteCprogramto find thefactorialofagiveninteger. 2. WriteCprogramtofindtheGCD(greatestcommondivisor)oftwogivenintegers.	CO2
TASK-5	
1. WriteaCprogramtofindthelargestintegerinalistofintegers. **2.** WriteaCprogramthatusesfunctionstoperformthefollowing: i. AdditionofTwoMatrices ii. MultiplicationofTwoMatrices	CO3

TASK-6	
1. WriteaCprogramthatusesfunctionstoinsertasub-stringintoagivenmainstringfromagivenposition. **2.** WriteaCprogramtodetermineifthegivenstringisapalindromeornot	CO3
TASK-7	
1. WriteaCprogramtogeneratePascal'striangle. **2.** WriteaCprogramtoconstruct apyramidofnumbers.	CO4
TASK-8	
1. WriteaprograminCtoimplementBubblesort method. **2.** WriteaprograminC toimplement Selectionsort method.	CO4
TASK-9	
1. WriteaCprogramtoimplement Linearsearchmethod. **2.** WriteaCprogramto implementBinarysearch method.	CO4
TASK-10	
1. WriteaCprogramtoperformoperationsonStacksbyusingArrays. **2.** Writea CprogramtoperformoperationsonStacksbyusingLinkedList.	CO4

AdditionalExperiments:	
TASK-11	
1. WriteaCprogramtoimplementQueues byusingArrays. **2.** WriteaCprogramtoconvertInfix notationtoPostfixnotation.	
TASK-12	
1. WriteaCprogramtoimplementcircularQueuesbyusing Arrays. **2.** WriteaCprogramtosorttheelements byusingQuicksortmethod.	
TASK-13	
1. WriteaCprogramtoimplementSinglyLinkedListoperations. **2.** WriteaCprogramtoimplementDoublyLinkedListoperations.	
TASK-14	
1. WriteaprograminC toimplementInsertionSortmethod. **2.** WriteaprograminCtoimplementMergeSortmethod.	
TASK-15	
1. WriteaCprogramtoimplementFibonaccisearchtechnique. **2.** WriteaCprogramtoperformtheoperations byusingCircularlinkedlist.	

SNO	Topic	Reference
1	Arrays,SearchingandSorting	https://www.faceprep.in/data-structures/data-structures-programs/ https://www.edureka.co/blog/sorting-algorithms-in-c/
2	Stack,QueuesandLinkedLists	https://www.sanfoundry.com/c-programming-examples-stacks/ https://www.tutorialspoint.com/data_structures_algorithms/stack_program_in_c.htm https://www.tutorialspoint.com/data_structures_algorithms/linked_list_program_in_c.htm#:~:text=A%20linked%20list%20is%20a,a%20connection%20to%20another%20link.

TextBook(s):

1. **1.**CprogrammingandDataStructures,P.Padmanabham,ThirdEdition,BSPublications
2. 2.ComputerProgramming inC,V.Rajaraman,PHI.

ReferenceBook(s):

3. **1**.ProgramminginC–StephenG.Kochan,IIIEdition,PearsonEductaion.
4. 2. CProgrammingwithproblemsolving, J.A.Jones&K. Harrow,DreamtechPress

WebResources:

5. 1.MHRDVIRTUALLABS,IITKHARAGPUR:http://cse.iitkgp.ac.in/~rkumar/pds-vlab/
6. 2.MHRDVIRTUALLABS,IIITHYDERABAD:http://cse01-iiith.vlabs.ac.in/
7. 3.https://www.javatpoint.com/data-structure-tutorial
8. 4.https://cse.iitkgp.ac.in/pds/semester/2011a/CM/handout-PDS.pdf

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC108	DATABASEMANAGMENTSYSTEMSLAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	36	1.5	40	60	100

Pre-requisite:CProgramming

CourseObjectives:

- ImplementthebasicknowledgeofSQL queries andrelationalalgebra.
- Constructdatabasemodelsfor differentdatabaseapplications.
- Applynormalizationtechniquesfor refiningofdatabases.
- Practicevarioustriggers,procedures,andcursorsusingPL/SQL.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	UsetheBasicsofSQLandConstructqueriesusingSQLinDatabaseCreationandInteraction(BL-3)
CO2	IllustratetheIntegrityconstraints,Joins&Viewstodevelopefficientdatabasesusing SQL.(BL-2)
CO3	AbletodevelopPL/SQLprogramsincludingProcedures,Functions,CursorsandTriggers. (BL-3)
CO4	UnderstandofERModels &RelationalModelasaCasestudy(BL-3)

CO-POMapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
CO1	2	2	2										1	1
CO2	1	3	2										2	2
CO3	1	3	3										2	2
CO4	3	2	3	1					1				2	
1:Low,2-Medium, 3-High														

COURSECONTENT(PART-A)	**CO**
TASK–1: **Practicesession**:StudentsshouldbeallowedtochooseappropriateDBMS softwarelikeSQLInstallit,configureitand startworkingonit. Create sample tables like Employee, Department, Student, Sailor etc., and perform necessaryDDLandDMLoperationsandinsert10recordsexecutesomequeries,useSQLfeatures 1.CreateatablecalledEmployeewiththefollowingstructure. **Name** **Type** Empno Number Ename Varchar2(20) Designation Varchar2(20) Manager Number Salary Number Deptno Number a. AddacolumnDOJ(DateofJoin) withdomaintotheEmployeetable. b. InsertanyTenrecordsintothetable. c. UpdatethecolumndetailsofDesignation	**CO1**

d. AddacolumnEmpAddress	
enamethecolumnof Employeetableusingaltercommand. f.Performsomedeleteoperationsbyselectinganyemployee 2.Createdepartmenttablewiththefollowingstructure. **Name Type** Deptno NumberDeptn ame Varchar2(20) City Varchar2(20) a. Addcolumndesignationtothedepartmenttable. b. Insert valuesintothetable. c. Listtherecords ofemptablegroupedbydeptno. d. Updatetherecordwheredeptnois2. e. Deleteanycolumndatafromthetable 3.Createatable calledStudenttable **Name Type** Stunum Number Stuname Varchar2(20) StudentAddVarchar2(20)Stu _city Varchar2(20) a. Insertrecordsintothetable. b. Add Gradecolumntothetable. c. Alterthetable columndomain. d. Deletetherows ofStudenttablewhoseStu_cityis'hyd'. 4. Createatablecalledsailortable **Name Type** Sid Number Sname Varchar2(20) rating Varchar2(20) a. Addcolumnagetothesailortable. b. Insert10valuesintothesailortable. c. Deletetherowwithrating>5. d. Updatethecolumndetailsofsailor.	
Objective: Practice onthe necessaryDDLandDMLcommandsinSQLandabletocreatethetables andperformoperations onit	
TASK-2: QueriesusingAggregatefunctions(COUNT,SUM,AVG,MAXandMIN),andalsoimplement GROUP BY, HAVING operations on tablesQueries using Conversion functions(to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim,lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months,last_day,months_between,least,greatest,3rank,round,to_char,to_date)	**CO1**

Objective: NeedofAggregatefunctionsandconversionfunctionsinDBMSandits implementationontables	
TASK-3: Queries(alongwith subQueries) usingANY,ALL,IN,EXISTS,NOTEXISTS, UNION,INTERSECT,Constraints,AddPrimaryKeyandForeignKeyandallIntegrityConstraintson	**CO1**
theEmployeeTableandDepartmentTables	
Objective:Needand roleofKeyconstraints	
TASK-4: ForallthethreetablesEmployee,Department,Student– CreateviewandSequencesaswellasdroptheviews.	**CO2**
Objective: Usageofviewand sequencesinDBMS withregarding totables	
TASK-5: Performalltypes ofJOINSonEmployeeandDepartmentTables	**CO2**
Objective: ImportanceofJOINoperationinDBMSanddifferent typesofJoinsandits implementationonTables	
PART-B(PL/SQLPrograms)	
TASK-6: 1. a.Writea PL/SQLprogramtoswaptwonumbers. b.WriteaPL/SQL programtofindthelargestofthreenumbers. 2. a.WriteaPL/SQLprogramtofindthetotalandaverageof6subjectsanddisplaythegrade. WriteaPL/SQLprogramtofindthesumofdigitsinagivennumber	
Objective: Abletocreateanddevelopadatabaseandabletoperformnecessaryoperationsonit	
TASK-7: 1. a.WriteaPL/SQL programto displaythenumberinreverseorder. b.WriteaPL /SQL programtocheckwhetherthegiven numberis primeornot. 2. WriteaPL/SQLprogramto findthefactorialofagivennumber.	**CO3**
Objective: DomainKnowledgeonPL/SQLandhowtowrite, compileandexecute programsinPL/SQLPrograms	
TASK-8: **1.** Creation of simple PL/SQL program which includes declaration section, executable section andexception –Handling section (Ex. Student marks can be selected from the table and printed forthosewhosecuredfirstclassandanexceptioncanberaisedifnorecordswerefound) **2.** Insertdataintostudenttableand useCOMMIT,ROLLBACKandSAVEPOINTinPL/SQLblock.Develop a program that includes the features NESTED IF, CASE and CASE expression. TheprogramcanbeextendedusingtheNULLIFandCOALESCEfunctions	**CO3**
Objective: DomainKnowledgeonPL/SQLandhowtowrite, compileandexecuteprogramsinPL/SQLPrograms	

TASK-9: 1.CreateAREAtable withthefollowingstructure. **Name** **Type** Radius Number(2)	**CO3**
Area Number(4,2) a. Insertthevalues forRadius varyingfrom3 to7 b. WriteaPL/SQLBlocktofindtheareaof acircleandupdatetheresultintheAREATable	
Objective: RetrievingdatafromSQLtoPL/SQLandperformingoperationson it**.**	
TASK-10: 1. WriteaPL/SQL BlockbyusingCURSORS 2. DevelopProgramsusingBEFOREandAFTERTriggers,RowandStatementTriggersandINSTEADOFTrigger	**CO3**
Objective: Implementationand usageofcursors&TriggersinPL/SQLblocks	
TASK-12: **1.** Createtheprocedureforpalindromeofgiven number. **2.** CreatetheprocedureforGCD: ProgramshouldloadtworegisterswithtwoNumbersandthenapplythelogicforGCDoftwonumbers.	**CO3**
Objective: DevelopingandimplementationofProcedures inPL/SQL	
TASK-13: Apublishingcompanyproduces scientificbooksonvarious subjects.Thebooks arewrittenbyauthors who specialize in one particular subject. The company employs editors who, notnecessarily being specialists in a particular area, each take sole responsibility for editing one ormorepublications. Apublicationcoversessentiallyoneofthespecialistsubjects andis normallywrittenbyasingleauthor. When writing a particular book, each author works with on editor, but may submitanother work for publication to be supervised by other editors. To improve theircompetitiveness, the company tries to employ a variety of authors, more than one author being aspecialistinaparticularsubjectfortheabovecasestudy,dothefollowing: 1. Analyzethedatarequired. 2. Normalizetheattributes. CreatethelogicaldatamodelusingE-Rdiagrams	**CO4**
Objective: DevelopingofER-DiagramsandanalyzingoftheER-Diagrams	

AdditionalExperiment:	
TASK-14: A publishing company produces scientific books on various subjects. The books are written byauthors who are expertise in one particular subject. The company employs editorswho,notnecessarily being specialists in a particular area, each take sole responsibility for editingoneormorepublications. A publication covers essentially one of the specialist subjects and is normally written by a singleauthor. When writing a particular book, each author works with one editor, but the author cansuggestothersworkwhichisbeingsupervisedbyothereditors.Toimprovetheircompetitiveness,thecompanytriestoemployavarietyofauthors,morethanoneauthorbeinga specialist inaparticularsubjectfortheabovecasestudy,dothefollowing:	**CO4**
1. Analyzethedatarequired. 2. Normalizetheattributes. 3. CreatethelogicaldatamodelusingE-Rdiagrams	
Objective:: CreationandimplementationofERDiagramsanddevelopmentofandformationoftables	

VirtualLabs:

1. http://vlabs.iitb.ac.in/bootcamp/labs/dbms/exp8/index.php
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

Self-Study:

ContentstopromoteSelf-Learning:

SNO	CO	Reference
1	**CO1**	https://www.javatpoint.com/data-models
2	**CO2**	https://www.geeksforgeeks.org/structured-query-language/
3	**CO3**	http://www.myreadingroom.co.in/notes-and-studymaterial/65-dbms/465-functions-of-dbms.html
4	**CO4**	https://www.guru99.com/er-diagram-tutorial-dbms.html

TextBook(s):

1. A.Silberschatz,H.F.Korth,S.Sudarshan,"DatabaseSystemConcepts,"McGrawhill,6thEdition,2011
2. RaghuRamakrishnan,"DatabaseManagementSystem",TataMcGraw-HillPublishingCompany,3rdEdition,2003
3. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, "Database System Implementation",PearsonEducation, UnitedStates, 1st Edition,2000.

ReferenceBook(s):

1. RamezElmasri,ShamkantB.Navathe,"FundamentalDatabaseSystems",PearsonEducation,3rdEdition,2003.
2. PeterRob, CorlosCoronel,"DatabaseSystem,Design,ImplementationandManagement"ThompsonLearningCourseTechnology,5th Edition, 2003.
3. C.J.Date,"*IntroductiontoDatabase Systems,*"PearsonEducation,8th Edition,2006.

Online/WebResources:

1. http://vlabs.iitb.ac.in/bootcamp/labs/dbms/exp8/index.php
2. https://www.w3schools.com/sql/sql_intro.asp
3. https://www.w3resource.com/sql-exercises/
4. https://lecturenotes.in/practicals/13627-lab-manuals-for-database-management-system-dbms-by-abhishek-apoorv

NARAYANAENGINEERING COLLEGE:NELLORE								
20MC109	OPERATINGSYSTEMSLAB							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	36	1.5	40	60	100

Pre-requisite:CProgrammingLanguage

CourseObjectives:

- ToimplementvariousCPUScheduling, DeadlockAvoidanceandDetectionAlgorithms
- ToimplementPageReplacement,FileOrganizationandFileAllocationAlgorithms
- ToImplementmemorymanagementschemes
- ImplementFileOrganizationtechniques

CourseOutcomes:

CO1	AnalyzeandSimulateCPUSchedulingAlgorithms likeFCFS,RoundRobin,SJF,Priority **(BL-3)**
CO2	AnalyzeDeadlockdetection,avoidance
CO3	Implementmemorymanagementschemes**(BL-3)**
CO4	ImplementFileOrganizationtechniques**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	3	2	2	1									2	1
CO2	3	3	2	2	1								2	2
CO3	3	2	2	1									2	1
CO4	3	3	2	2	1								2	2

1:Low,2-Medium,3-High

COURSECONTENT	CO
OPERATINGSYSTEMS	
TASK–1:CPUSchedulingAlgorithms	**CO1**
1. WriteaCprogramtosimulatethefollowingnon-preemptiveCPUSchedulingalgorithmstofindturnaroundtime andwaitingtime. (a) FCFS (b)SJF	
TASK–2:CPUSchedulingAlgorithms	
1. Write a C program to simulate the following non-preemptive CPU SchedulingAlgorithmstofindturnaroundtimeandwaitingtime. (a) RoundRobin (b)Priority	CO3
TASK-3:BankersAlgorithm-DeadlockAvoidance	
1.WriteaCprogramtosimulateBankersalgorithmforthepurposeofdeadlockavoidance	
TASK-4:BankersAlgorithm-DeadlockPrevention	CO4
1.WriteaCprogramtosimulateBankersalgorithmforthepurposeofdeadlock prevention	
TASK-5:PageReplacementAlgorithms	

1.WriteaCprogramtosimulatepagereplacementalgorithmsa)FIFO b)LRU c)LFU	CO4
TASK-5:MemoryManagement	
1.WriteaCprogramtosimulatetheMVTandMFTmemory management techniques	
TASK-6:ProcessSynchronization	
1.Controlthenumberifportsopenedbytheoperatingsystemwitha)Semaphore b)Monitors	**CO4**
TASK-7:Paging	
1.SimulatePagingtechniqueof memorymanagement	**CO3**

ADDITIONALEXPERIMENTS	
TASK-1:FileallocationStrategies	
1.WriteaCprogramtosimulatethefollowingfileallocationstrategies. (a) Sequential (b) Indexed (c) Linked	CO3
TASK-2:FileOrganizationTechniques	
1.WriteaCprogramtosimulatethefollowingfileorganizationtechniques (a) Singleleveldirectory (b) Twoleveldirectory	CO4
TotalHours:	**36 Hours**

VirtualLabs:

1. https://cse.iitkgp.ac.in/~chitta/coldvl/comp.html
2. https://cse11-iiith.vlabs.ac.in/
3. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/CRUX/labs/exp1/index.html

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	CPUSchedulingAlgorithms	https://www.geeksforgeeks.org/cpu-scheduling-in-operating-systems/
2	PageReplacement **Algorithms**	https://www.javatpoint.com/os-page-replacement-algorithms
3	memory management schemes	https://www.javatpoint.com/os-memory-management-introduction
4	FileOrganization techniques	https://www.javatpoint.com/file-organization-storage

TextBook(s):

1. AnIntroductiontoOperatingSystems,P.C.PBhatt,2ndedition,PHI.
2. .OperatingSystemConcepts,AbrahamSilberchatz, Peter B. Galvin,GregGagne, Wiley,EightEdition,2014.

ReferenceBook(s):

1. OperatingsystemsbyAKSharma,UniversitiesPress.
2. OperatingSystems,S.Haldar,A.A.Aravind,PearsonEducation.
3. ModernOperatingSystems,AndrewS Tanenbaum,SecondEdition, PHI.
4. OperatingSystems,G.Nutt,N.ChakiandS.Neogy,ThirdEdition, PearsonEducation.
5. OperatingSystems,R.Elmasri, A,G.CarrickandD.Levine, McGrawHill.
6. Principles ofOperatingSystems,B.L.Stuart,Cengagelearning,IndiaEdition.OperatingSystemDesgin,DouglasComer,CRCPress,2ndEdition

OnlineResources/WebReferences:

1. http://pages.cs.wisc.edu/~remzi/OSTEP/cpu-sched.pdf
2. http://pages.cs.wisc.edu/~remzi/OSTEP/vm-api.pdf
3. http://pages.cs.wisc.edu/~remzi/OSTEP/file-intro.pdf
4. http://pages.cs.wisc.edu/~remzi/OSTEP/file-implementation.pdf
5. http://pages.cs.wisc.edu/~remzi/OSTEP/vm-beyondphys-policy.pdf

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC201	OBJECTORIENTEDPROGRAMMING THROUGHJAVA							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Basicknowledgeofprogramming.

CourseObjectives:

1. ToacquireknowledgeonpreliminariesofJava.
2. Toprovidesufficientknowledgeondevelopingrealworldprojects.
3. Todemonstratetheprinciplesofpackages,inheritanceandinterfaces.
4. Tounderstandexceptionhandling,EventhandlingandMultithreading.
5. Todesignandbuild GraphicalUserInterface applications.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Implement ObjectOrientedProgrammingconcepts.(BL-3)
CO2	Understand theconceptsofArraysand Strings.(BL-2)
CO3	Constructprogramsonclasses, inheritanceandpolymorphism.(BL-3)
CO4	Developpackagesandinterfaces.(BL-3)
CO5	Constructprogramsonmulti-threadingandwrapperclasses.(BL-3)
CO6	UnderstandEvent Handlingand frames.(BL-2)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2									1	3	2
CO2	2	2	2		1							1	1	2
CO3	2	2	2	2	1				1			2	1	2
CO4	2	2	2	1								3	1	1
CO5	2	2		2					1			3	2	1
CO6	2	2	2	2					2			3	2	2

1:Low,2-Medium, 3-High

COURSECONTENT

MODULE –1	JavaBasics	8h

Java Basics: History of Java, Java buzzwords, comments, data types, variables, constants, scopeand life time of variables, operators, operator hierarchy, expressions, type conversion and casting,control flow-block scope, control statements, simplejava program, arrays, inputand output,formattingoutput.

Reviewof OOP concepts: encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this reference,overloadingmethodsandconstructors,exploringstringclass.

At theendofthe Module1,studentswillbeableto:

1. DescribethePurposeofObject orientedProgramming Concepts.(BL-2)
2. Explaintheimportanceofjava. (BL-2)
3. Identifyvariousbasiccomponentsofjava.(BL-2)
4. Implementprogramson fundamentalconceptsofjava.(BL-3)

MODULE-2	Inheritance	8h
Inheritance: Inheritanceconcept,benefitsofinheritance,SuperclassesandSubclasses,Memberaccessrules,Inheritancehierarchies,superuses,methodoverriding,finalkeyword**.** **Interfaces & Packages:**Abstractclasses andmethods, Interfaces vs. Abstractclasses, defininganinterface,implementinginterfaces,accessingimplementationsthroughinterfacereferences, extendinginterface,Packages-Defining,CreatingandAccessingaPackage,importingpackage		
At theendofthe Module2,studentswillbeableto: **1.** Understandinterfaces.**(BL-2)** **2.** Demonstratepackages.**(BL-2)** **3.** Explainthe abstraction.**(BL-2)**		
MODULE-3	**JavaI/OStreams**	**8h**
JavaI/Ostreams: Bytestreams,characterstreams,textInput/output,binaryinput/output,randomaccessfile operations,FilemanagementusingFileclass,java.io. **Networking:** Introduction, ManipulatingURLs, Ex. Client/ServerInteractionwithStreamSocketConnections,java.net.		
At theendofthe Module3,studentswillbeableto: **1.** Understand theI/O Streams.**(BL-2)** **2.** Explainnetworking.**(BL-2)** **3.** Describesocketprogramming.**(BL-3)**		
MODULE-4	**Exception Handling**	**7h**
Exceptionhandling: Dealingwitherrors,benefitsofexceptionhandling, theclassificationofexceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try,catch, throw, throws and finally, Re-throwing exceptions, exception specification, built inexceptions,creatingownexceptionsubclasses. **Multithreading:**Differencesbetweenmultipleprocessesandmultiplethreads,threadstates, creatingthreads,interruptingthreads,threadpriorities,synchronizingthreads,interthreadcommunication,threadgroups,daemonthreads.		
At theendofthe Module4,studentswillbeableto: **1.** Explaintheconceptofmultiplethread.**(BL-2)** **2.** Discussthreadstatesanditspriorities.**(BL-3)** **3.** UnderstandtheconceptofSynchronization.**(BL-2)**		
MODULE-5	**Applets**	**8h**
Applets: Inheritancehierarchyforapplets,differencesbetweenappletsandapplications,lifecycleof an applet - Four methods of an applet, Developing applets and testing, passing parameters toapplets,appletsecurityissues. **Event Handling:** Events, Event sources, Event classes, Event Listeners, Relationship betweenEvent sourcesandListeners,Delegationevent model,Examples: handlingabuttonclick,handlingmouse andkeyboardevents,Adapterclasses.		
At the endofthe Module 5,studentswillbe able to: **1.** UnderstandApplets.**(BL-3)** **2.** UnderstandtheconceptofEventHandling.**(BL-2)**		
MODULE-6	**GUIProgramming with Java**	**9h**
GUI Programming with Java: The AWT class hierarchy, Introduction to Swing, Swing vs.AWT,MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet,JWindow, JDialog,Light weightcontainers– JPanel,Asimpleswingapplication, Overviewofseveralswingcomponents- Jbutton, JToggleButton, JCheckBox, JRadioButton,		

JLabel,JTextField,JTextArea,JList,JComboBox,JMenu.

Java'sGraphicsCapabilities: Introduction,GraphicscontextsandGraphicsobjects,colorcontrol, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layoutmanagertypes–border,grid,flow,box**.**

At theendofthe Module6,studentswillbeableto:

1. ExplaineventClasses.**(BL-2)**
2. Understandthehierarchyofcomponentclass.**(BL-2)**
3. UnderstandEventListenerInterfaces**(BL-2)**
4. ExplainframeandAWT controls injava.**(BL-2)**

Totalhours:	**48hours**

Termwork:

1. MiniProjectonLibraryManagement.
2. SolveThreeProblemsfromHackerRank.
3. SolveThreeProblemsfromHackerEarth.
4. SolveThreeProblems fromCodeChef.
5. SolveThreeProblemsfromProjectEuler.
6. SolveThreeProblemsfromLeetCode.
7. DevelopStandaloneapplicationslikebillprinting.
8. Apartofsoftwaredevelopmentseveralpackagesaredevelopedcollectivelycalledaslibrary andreusableinfurtherprojects.
9. Createaapplicationtocalculatesimpleinterestbyusingeachandeverymethodinwrappe rclasses.
10. Userinterfacedialogsrelatedprograms
11. I/Oprocessingprograms.
12. Writeacasestudymulti-threadedprogramming.
13. Writeacasestudyonexceptionhandling.
14. Writeacasestudyoneventhandling.
15. WriteacasestudyonOOP conceptsand giveexampleprogramsforallconcepts.
16. Writeacasestudyonconstructorsand examplefor alltypes.
17. Write a Java program that creates a user interface to perform integer division. The userenterstwonumbers in the text fields, Num1 and Num2. The division of Num1 andNum2 is displayed in the Result field when the Divide button is clicked. If Num1 andNum2 were not integers, the program would throw a Number Format Exception. IfNum2werezero,theprogramwouldthrowanArithmeticExceptionDisplaytheexceptionina message dialogbox.
18. DevelopaJavaapplicationtoperformAddition,Division,Multiplicationandsubst ractionusing JOptionPane dialogBoxandTextfields.
19. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As eachnumber is read display it only if it's not a duplicate of any number already read displaythecomplete setofunique valuesinputafterthe userenterseachnew value.
20. WritecasestudyonString,StringBuffer,StringBuilder,StringTokenizermethodswithexam ples.
21. Writecasestudyonarrays(oneandmulti-dimentional)withmatrixaddition,subtraction andmultiplication.

Contentbeyondsyllabus:

1. Client/ServerCommunicationapplications(Servlets,jsp).
2. Databaseconnectivity(JDBC).

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	The HistoryandEvolutionof java, Datatypes, variables	https://nptel.ac.in/courses/106/105/106105191/ (lecture1,2,3)
2	Arrays,Strings	https://www.udemy.com/course/java-for-absolute-beginners/
3	Introductiontoclasses,I nheritance, Polymorphism	https://nptel.ac.in/courses/106/105/106105191/(lecture 13,14,15)
4	Packages,Interfaces, ExceptionHandling.	https://nptel.ac.in/courses/106/105/106105191/ (lecture20,21,22,23)
5	Multi-ThreadedProgramming,Enumerations,Autoboxing	1. https://www.youtube.com/watch?v=TCd8QIS-2KI(Edureka) 2. https://www.edureka.co/advanced-java-sp?qId=856296e26b4a2a954919bfb8fb145248&index_name=prod_search_results_courses&objId=193&obPos=1
6	EventHandling, Introducingtheawt.	1.https://nptel.ac.in/courses/106/105/106105191/ (lecture 39,40,42)

TextBook(s):

1. Java:HerbertSchildt"JavaThecompletereference",9th edition,McGrawHillEducation(India) Pvt.Ltd.
2. BeginningJava2, JDK5thEdition, IvorHorton,Wileydreamtech.
3. E Balagurusamy,ProgrammingWithJava:APrimer5thEditionTataMcGrawHill.

ReferenceBook(s):

1. Anintroductiontojavaprogrammingandobjectorientedapplicationdevelopment,RAJohson-Thomson.
2. Introductiontojavaprogramming6thEdition, YDanielliang, PearsonEducation.
3. Javaprogramming:Apracticalapproach,C.Xavier,TMH,Firstedition,2011.
4. BruceEckel,ThinkinginJava,2ndEdition,PearsonEducation
5. H.MDietelandP.JDietel,JavaHowtoProgram,6thEdition,PearsonEd.
6. Y.DanielLiang,IntroductiontoJavaprogramming-comprehensive,TenthEdition,Pearsonltd2015.

OnlineResources:

1. https://www.udemy.com/course/java-programming-tutorial-for-beginners/
2. https://www.edx.org/professional-certificate/uc3mx-introduction-java-programming
3. https://www.coursera.org/specializations/java-programming
4. https://www.classcentral.com/course/java-programming-4305
5. https://www.edx.org/course/learn-to-program-in-java-2

WebReferences:

1. https://nptel.ac.in/courses
2. https://freevideolectures.com/university/iitm
3. www.javatpoint.com
4. https://www.tutorialspoint.com/jaindex.htm
5. https://docs.oracle.com/javase/tutorial/
6. https://www.w3resource.com/java-exercises/
7. https://www.geeksforgeeks.org/java/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC202	PYTHONPROGRAMMING							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100
Pre-requisite:OOPConcepts								
CourseObjectives: 1. Knowthebasicsofpythonprogrammingsuchastokens,datatypesetc. 2. GetideaonthecontrolstatementslikeDecisionsandLoops 3. Knowhowtousefunctionsandthestringhandlingmechanismsinpythonlanguage 4. Recognizewiththeconceptsoftuplesanddictionariesinpythonlanguage 5. Comprehendfilehandlingconcepts,modulesandpackagesofpython 6. Identifypythonobjectsandworkwithexceptionhandling								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Writebasicprograms inPython.(BL-1)							
CO2	Writeprogramsinpythonforloopingstructures.(BL-1)							
CO3	Writeprogramsinpythonforfunctionsandstringhandlingmechanisms.(BL-1)							
CO4	Executeprogramsoncreationoflists,tuplesanddictionariesusingpython.(BL-3)							
CO5	Implementfilehandlingmechanisms,modulesandpackagesofpython.(BL-3)							
CO6	Writeprogramswithpythonobjectsandexceptionhandlingmechanism.(BL-1)							

CO-POMapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	1												
CO2	2	1											2	
CO3	2	2		1									2	
CO4	1	1			1								1	
CO5	1	1		1										2
CO6	1	2		2										2
1:Low,2-Medium,3-High														

COURSECONTENT		
MODULE–1	**BasicsofPython**	**8HOURS**
BASICS OF PYTHON PROGRAMMING: Introduction to Python, Python Characterset, Tokens,Core Data Types, variables, Assignment of values to variables, Writing simple programs in Python,input()andeval() functions **Operatorsand Expressions:**Arithmetic Operators, Operator Precedence and Associativity,BitwiseOperatorsandBooleanOperators		
AttheendoftheModule1,studentswillbeableto: 1. Learnbasics ofpythonprogramming.(BL-2) 2. Writesimpleprogramsinpython(BL-4) 3. Evaluatevariousoperatorsandexpressions**(BL-5)**		
MODULE-2	**ControlFlow inPython**	**7HOURS**
DecisionStatements:ifstatement,if-elsestatement,nestedifstatement,multi-wayif-elif-elsestatement **LoopStatements:**whileloop,range()function,forloop,nestedloops,breakandcontinuestatements		

AttheendoftheModule2,studentswillbeableto: **1.** EvaluateDecisionstatementsinpython**(BL-3)** **2.** Examinethevariousloopstatements**(BL-4)** **3.** Evaluatetheworkingof allcontrolflowstatements**(BL-3)**		
MODULE-3	**Functions&Strings**	**10HOURS**
Functions: Syntaxandbasicsofafunction,parametersandargumentsinafunction,returnstatement,recursivefunctions **Strings:**BasicPythonfunctionsfor String,Stringoperators,StringOperations		
AttheendoftheModule3,studentswillbeableto: **1.** LearntheimplementationofFunctionsinpython**(BL-2)** **2.** Analyzetheworking ofstrings**(BL-4)** **3.** Learnvarious stringfunctions**(BL-2)**		
MODULE-4	**Lists,TuplesAndDictionaries**	**8HOURS**
Lists: Creating Lists,Slicing Lists,ListMethods,Listsand Strings,ListswithFunctions,SearchingandSortinginlists **Tuples:**Creatingtuples, inbuiltfunctionsfortuples, ListsandTuples **Dictionaries:** Basicsof dictionaries,Creating adictionary,Formatting dictionaries,MethodsofDictionaryclass		
Attheendof theModule4,studentswillbeableto: **1.** Createdifferentlistsinpythonandimplementtheirmethods**(BL-6)** **2.** Createtuplesandanalyzethefunctionalityoflists withtuples**(BL-6)** **3.** Createbasicdictionariesandidentifytheirmethods**(BL-6)**		
MODULE-5	**FileHandling,Modules&Packages**	**7HOURS**
FileHandling: Introduction,Workingwithtextfiles **Modules:**Definition,Creatinga Module, StandardmodulesofPython **Packages:**Definition,Importing*frompackages,Packagesinmultipledirectories		
Atthe endoftheModule5,studentswillbeableto: 1. Learnhowto workwithtextfilesinpython(BL-2) 2. Createamoduleandlearnvarious standardmodulesofpython(BL-6) **3.** Learnhowtoimportpackagesfromvariousdirectories**(BL-2)**		
MODULE-6	**OOPandExceptionHandling**	**8HOURS**
Object Oriented ProgramminginPython: Classes,'self-variable',Methods,ConstructorMethod,Inheritance,OverridingMethods,Datahiding. **ErrorandExceptions:**DifferencebetweenanerrorandException,HandlingException,tryexceptblock,RaisingExceptions,UserDefinedExceptions		
AttheendoftheModule6,studentswillbeableto: **1.** Learntheobjectorientedprogramminginpython**(BL-2)** **2.** Handlevariousexceptions usingblocks**(BL-3)** **3.** Implementuserdefinedexceptions**(BL-3)**		
	Totalhours:	**48HOURS**

Termwork:

DevelopaPythonprogramforDiceRollingSimulator.

Contentbeyondsyllabus:

1. PythonMultithreading
2. PythonGUIprogramming

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	PythonOperators	https://www.javatpoint.com/python-operators https://www.tutorialspoint.com/python/python_basic_operators.htm
2	PythonLoops	https://www.javatpoint.com/python-loops https://www.tutorialspoint.com/python/python_loops.htm
3	PythonFunctions	https://www.javatpoint.com/python-functions https://www.tutorialspoint.com/python/python_functions.htm
4	PythonLists	https://www.javatpoint.com/python-lists https://www.tutorialspoint.com/python/python_lists.htm
5	Python Modules	https://www.javatpoint.com/python-modules https://www.tutorialspoint.com/python/python_modules.htm
6	PythonOOPs	https://www.javatpoint.com/python-oops-concepts https://www.tutorialspoint.com/python/python_classes_objects.htm

TextBook(s):

1. ProgrammingandProblemSolvingwithPythonby AshokNamdevKamthaneand AmitAshokKamthane,McGrawHillEducation;FirsteditionNovember2017
2. Python Programming: A Compatible Guide for Beginners to Master and Become an Expert inpythonprogrammingLanguage,BrainDraper,CreateSpaceIndependent PublishingPlatform,2016
3. ProgrammingPython,MarkLutz, O'Reilly,3rdEdition, 2006

ReferenceBook(s):

1. PythonProgramming:AModernApproach,VamsiKurama,Pearson
2. ThinkPython,AllenDowney,GreenTeaPress
3. CorePythonProgramming,WesleyJChun,PH,2ndEdition
4. IntroductiontoPython,KennethA.Lambert,Cengage

OnlineResources:

1. http://www.freebookcentre.net/Language/Free-Python-Books-Download.html
2. https://www.pdfdrive.com/python-programming-books.html
3. https://books.goalkicker.com/PythonBook/

WebReferences:

1.1.https://nptel.ac.in/courses/106/106/106106182/
2. https://www.javatpoint.com/python-tutorial
3. https://www.python.org/about/gettingstarted/
4. https://www.tutorialspoint.com/python/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC203	ARTIFICIALINTELLIGENCE							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:OOPLanguageslikejavaandpython

CourseObjectives:

1. Learnaboutbasic AIfundamentals and AIproblems.
2. Studentswill gainanunderstandingabout searching.
3. StudyaboutAIgame playingconcepts.
4. UnderstandaboutAIknowledge
5. StudentswillknowaboutAIorderlogic
6. TounderstandtheInvestigatevariousexpertsystems

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO 1	StateapplicationsofArtificialIntelligence
CO 2	EnumerateproblemsolvingstrategiesinAI
CO 3	Illustrateproblemreductiontechniques
CO 4	Listthelogicconcepts
CO 5	AnalyzethecurrentknowledgerepresentationtechniquesinAI
CO 6	Investigatevariousexpertsystems

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2	1	3										3	
CO2	3	1	2										2	1
CO3	2	2	3	1									2	2
CO4	1	2		3	2								1	
CO5	1	1	2											2
CO6	2	2	2										1	

1:Low,2-Medium,3-High

COURSEC ONTENT

MODULE– 1	IntroductiontoArtificialIntelligence	8Hours

Introduction To Artificial Intelligence: Introduction ,history, intelligent systems, foundationsof AI,applications,tic-tac-tiegame playing,development ofAIlanguages,currenttrendsin AI.

Problem Solving: State-Space Search And Control Strategies: Introduction, general problem solving,characteristicsof problem,exhaustivesearches,heuristicsearchtechniques,iterative-deepeninga*,constraint satisfaction.

At theendof theModule 1,students will be ableto:

1. AnalyzethecomponentsofState applicationsofArtificialIntelligence
2. Understandtheuse variousProblemsolving.
3. Understandingaboutsearching.

MODULE-2	ProblemReductionandLogicConcepts	8Hours

ProblemReductionAndGamePlaying: Introduction,problemreduction,gameplaying,alpha-betapruning, two-playerperfectinformationgames. **LogicConcepts:**Introduction,propositionalcalculus,proportionallogic,naturaldeductionsystem,axiomaticsystem,semantictableausysteminproportionallogic,resolutionrefutationin proportionallogic,predicatelogic.		
AttheendoftheModule2,studentswill beableto: 1. understandingofothertopicssuchasminimax,resolution,etc.thatplayanimportantroleinAIprograms. 2. IdentifytheuseofLogicconcepts.		
MODULE– 3	**KnowledgeRepresentationandTechniques**	**8Hours**
Knowledge Representation: Introduction, approaches to knowledge representation, knowledgerepresentationusingsemanticnetwork,extendedsemanticnetworksforKR,knowledgerepresentationusingframes. **AdvancedKnowledgeRepresentationTechniques:** Introduction,conceptual dependencytheory, scriptstructure,CYCtheory,casegrammars,semanticweb.		
AttheendoftheModule3,studentswillbeableto: 1. AnalyzetheAIknowledge 2. UnderstandtheuseofAdvancedknowledgerepresentationtechniques.		
MODULE– 4	**Artificialneuralnetworks**	**8Hours**
Artificialneuralnetworks: Introduction, artificialnetworks,single layerfeedforwardnetworks,multi layeredforward networks,designissuesofartificialneuralnetworks. **Uncertaintymeasure:probabilitytheory:**Introduction,probabilitytheory,Bayesianbelief networks,certaintyfactortheory,dempster-shafertheory.		
AttheendoftheModule 4,studentswillbeableto: 1. UnderstandthevariousInvestigatevariousexpertsystems 2. Identifytheuse Expertsystemapplications.		
MODULE– 5	**Fuzzy Logic andML paradigms**	**8Hours**
Fuzzysetsandfuzzylogic: Introduction,fuzzysets,fuzzysetoperations,typesofmembershipfunctions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions,inferencerules forfuzzypropositions,fuzzysystems **Machinelearningparadigms**:Introduction,machinelearningsystems,supervisedandunsupervisedlearning's,inductivelearning,deductivelearning,clustering,supportvectormachines,casebased reasoningandlearning.		
AttheendoftheModule5,studentswillbeableto: 1. Analyzethedifferentprobabilitytheory. 2. IdentifytheFuzzysetsandfuzzylogic		
MODULE-6	**Expertsystemsandapplications**	**8Hours**
Expertsystemsandapplications:Introductionphasesinbuildingexpert systems, expertsystemversustraditionalsystems,rule-basedexpertsystems,blackboardsystems,truth maintenancesystems,applicationsofexpertsystems,list ofshellsandtools		
AttheendoftheModule6,studentswillbeableto: 1. Tounderstandthe featuresMachinelearningparadigms 2. UnderstandtheuseArtificialneuralnetworks		
	Total hours:	**48hours**

Termwork: 1. proficiencyinatraditionalAIlanguageincludinganabilitytowritesimpletointermediateprogramsandanabilitytounderstandcodewritteninthatlanguage.

Contentbeyondsyllabus:

1.CloudDatasecurityusingcryptographictechniques.

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Stateapplicationsof ArtificialIntelligence	CO1	https://www.youtube.com/watch?v=VNRmsACNSaY
2	Enumerateproblemsolving strategiesinAI	CO2	https://www.youtube.com/watch?v=1CsC5aa0Zek
3	Illustrate problem reductiontechniques	CO3	https://www.youtube.com/watch?v=d7EI8B7jTrI
4	Listthelogicconcepts	CO4	https://www.youtube.com/watch?v=KWxTx7JlWLo
5	Analyze the current knowledgerepresentation techniquesinAI	CO5	https://www.youtube.com/watch?v=WEqY5kRk-g0
6	InvestigatevariousExpert systems	CO6	https://www.youtube.com/watch?v=NLeWaH6O-TE

TextBook(s):

1. ArtificialIntelligence-SarojKaushik,CENGAGELearning,
2. Artificialintelligence,AmodernApproach,2nded,StuartRussel,PeterNorvig,PEA
3. Artificial Intelligence-Rich,KevinKnight,ShivShankar BNair, 3rded,TMH
4. IntroductiontoArtificialIntelligence,Patterson, PHI

ReferenceBook(s):

5. Artificialintelligence,structuresandStrategiesforComplexproblemsolving,-GeorgeFLugar,5thed, PEA
6. IntroductiontoArtificialIntelligence,Ertel,WolfGang,Springer
7. ArtificialIntelligence,AnewSynthesis,NilsJNilsson,Elsevier

OnlineResources:

8. https://nptel.ac.in/courses
9. https://freevideolectures.com/university/iitm

WebResources:

10. https://www.youtube.com/watch?v=VNRmsACNSaY
11. https://www.youtube.com/watch?v=1CsC5aa0Zek
12. https://www.youtube.com/watch?v=d7EI8B7jTrI
13. https://www.youtube.com/watch?v=KWxTx7JlWLo
14. https://www.youtube.com/watch?v=WEqY5kRk-g0
15. https://www.youtube.com/watch?v=NLeWaH6O-TE

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC204	SOFTWAREENGINEERING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:Computerfundamentals

CourseObjectives:

- Tounderstandthesoftwarelifecyclemodels.
- TounderstandthesoftwarerequirementsandSRSdocument.
- Tounderstandtheimportantofmodelingandmodelinglanguages
- Todesignanddevelopcorrectandrobustsoftwareproducts
- Tounderstandthemaintenanceofthesoftware.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	IdentifythebestsuitableProcessMethodologyfordevelopingaqualityorientedsoftwaresolution**(BL-3)**
CO2	Sketchtherequirementsanalysismodelforaprojectworkbyusingvariousmodelingdiagrams**(BL-4)**
CO3	Applythestandarddesignprinciplesandselectthesuitable architecturalstylesforgivenspecifications**(BL-3)**
CO4	ExplainthestandardGoldenrulesfor developingtheuser interface**.(BL-2)**
CO5	AnalyzeTestingprinciplesonsoftwareproject.**(BL-4)**
CO6	Applyvarioussoftwaremetrics,whichdeterminesthequalitylevelofsoftware**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3												
CO2	2									2				
CO3		3	2		2									
CO4	2		2									1		
CO5					2									2
CO6			2	2										2

1:Low,2-Medium,3-High

COURSEC ONTENT

Module-1	IntroductiontoSoftwareEngineering	8HOURS

Software and Software Engineering: The Nature of Software,The Unique Nature of WebApps,SoftwareEngineering, TheSoftwareProcess, SoftwareEngineeringPractice,SoftwareMyths**(3H)**

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive ProcessModels, Specialized Process Models. The Unified Process, Personal and Team Process Models, ProcessTechnology, ProductandProcess.

Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming,OtherAgileProcessModels

Atthe endoftheModule1,studentswillbeableto:

1. Discussthedifferentphasesinvolvedinthesoftwaredevelopment**(BL-4)**
2. Identifysuitablelifecyclemodeltobeused.(BL-3)
3. Identifytheneedofagilityandexamine Agileprocessmodels**(BL-3)**

Module-2	**RequirementsEngineering**	**7HOURS**

UnderstandingRequirements:RequirementsEngineering,Establishingthegroundwork,ElicitingRequirements, Developing Use Cases, and Building the requirements model, Negotiating Requirements,ValidatingRequirements.

RequirementsModeling(Scenarios,InformationandAnalysisClasses): RequirementsAnalysis,Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-BasedModeling,RequirementsModelingforWebApps**.**

Atthe endoftheModule2,studentswillbeableto:

1. Analyzetheproblemand definethecomputing requirementsoftheproblem.**(BL-4)**
2. Examinethescenariobased modeling andclassbasedmodeling inthedesignphase**(BL-4)**
3. DevelopSRSforProblems**(BL-6)**

Module-3	**ArchitecturalDesignandComponentlevelDesign**	**10HOURS**

Design Concepts: Design with Context of Software Engineering, The Design Process, Design Concepts,The Design Model.**Architectural Design:** Software Architecture,Architecture Genres,ArchitectureStyles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping UsingDataFlow.

Component-Level Design: Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-BasedDevelopment**.**

Atthe endoftheModule3,studentswillbeableto:

1. Identifythebasicissuesinsoftwaredesign**(BL-3)**
2. Illustratetheimportanceofsoftwarearchitecture**(BL-2)**
3. Analyzethearchitecturestylesandbuildthesystemfromthecomponents.**(BL-4)**

Module-4	**UserInterfaceDesignandWebAPPDesign**	**8HOURS**

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis,InterfaceDesignSteps, WebAppInterfaceDesign,DesignEvaluation.

WebApp Design: WebApp Design Quality, Design Goal, A Design Pyramid for WebApps, WebAppInterfaceDesign,AestheticDesign,ContentDesign,ArchitectureDesign,NavigationDesign,Component-LevelDesign, Object-OrientedHypermedia DesignMethod(OOHMD).

Atthe endoftheModule4,studentswillbeableto:

1. ModelinggoldenrulesindesigningandanalyzingUI**(BL-3)**
2. DevelopingofwebAppdesign**(BL-6)**

3.Ideaaboutthedifferentdesignsanddesignstrategiesforsoftwareengineering**(BL-3)**		
Module-5	**IntroductiontoTesting&TestingStrategies**	**7HOURS**
Software Testing Strategies: A strategic Approach to Software Testing, Strategic Issues, Test Strategiesfor Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps,Validation Testing, System Testing, The Art of Debugging. Testing Conventional Applications: SoftwareTesting Fundamentals,White-BoxTesting,basic Path testing,Control Structure Testing,Black-BoxTesting. **Testing Object-Oriented Applications:** Broadening the View of Testing, Testing with OOA and OODModels, Object-OrientedTestingStrategies,Object-OrientedTestingMethods.		
Atthe endof theModule5,studentswillbeableto: **1.** Illustratethestrategicapproachtosoftwaretesting**(BL-2)** **2.** Explainthevarioustestingstrategies**(BL-2)** **3.** Applyandanalyzethetestcasesforthegivenproblemusingtestingstrategies.**(BL-3)**		
Module-6	**IntroductiontoProductMetricsandProcessandProducts**	**8HOURS**
Product metrics: Software Quality, Frame work for Product metrics, Metrics for Analysis Model,MetricsforDesignModel,Metricsforsourcecode, Metricsfortesting,Metricsformaintenance**.** **MetricsforProcessandProducts:**SoftwareMeasurement,Metricsforsoftwarequality**,**GanttChar t,PERTChart**.**		
Atthe endof theModule6,studentswillbeableto: **1.** Tounderstandmeasurementsusedfor testingtheproductivityofasoftwareproject**(BL-2)** **2.** Followstandardsforsoftwaredevelopmentandqualitymanagement.**(BL-3)** **3.** Differentmetricsanditsusageinsoftwareproducts**(BL-4)**		
	Totalhours:	**48HOURS**

Termwork:

1. **Elicitation:**

Toidentifythevariouselicitationtechniquesandtheirusagefortheбankingcasestudy.

Background:

Requirementelicitationistheprocessofseeking, discovering, acquiringandelaboratingrequirement.Thisincludes learning and understanding the needs of the users. This activity is communication centric anditerative in the nature. The techniques used here are the important to get stack holder consensus on therequirements.

2. **ProcessModels**

InSoftwareEngineeringidentificationofProcessModelsisanimportantconcept Justifyit?
CompareandcontrastallprocessmodelsinsoftwareengineeringandidentifyProsandConsineachofthemandconcludeeachprocessmodelwithasuitablestatement.

3. **AttributesofaGoodSoftware:**

This term work will helps how to justify whether a software is having all essential attributes or not at thetime of developing or executing what are required some examples are given analyze them and justify byselectinga goodproject.
Maintainability:softwareshouldbewritteninsuchawaythatitmayevolvetomeetchangingtheneeds

ofcustomers.
Dependability:softwaremustbetrustworthy
Efficiency: software should not make wasteful use of system
resourceUsability:softwaremustbeusablebytheusersforwhichitwas
designed.**4.DataFlowDiagrams:**
RoleofDataFlowdiagramsinSoftwareEngineeringanditsimportanceintheDesigningPhase
CreateadataflowdiagramofanATM (automatictellermachine)by explainingthesteps
involvedinitfromDFDLevel-0toLevel-3
5.Testing:
Why does integration testing reveal errors although unit testing has been done well? Why does systemtesting reveal errors although integration testing has been done well? Why does beta-testing reveal errorsalthoughsystemtestinghasbeendone well? Understandthescenarioandexplainit.

Contentbeyondsyllabus:

1. OpensourcesoftwareTestAutomationTools
2. GanttChart–RulesandMetrics
3. PERTChartTools-Metrics

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	SoftwareengineeringBasics	CO1	https://www.tutorialspoint.com/software_engineering/software_engineering_overview.htm
2	RequirementsEngineering	CO2	https://www.tutorialspoint.com/software_engineering/software_requirements.htm
3	SoftwaredesignBasics	CO3	https://www.tutorialspoint.com/software_engineering/software_design_basics.htm
4	UserInterface	CO4	https://www.tutorialspoint.com/software_engineering/software_user_interface_design.htm
5	SoftwareTesting	CO5	https://www.tutorialspoint.com/software_testing/software_testing_overview.htm
6	Productmetrics	CO6	https://www.tutorialspoint.com/software_quality_management/software_quality_measurement_metrics.htm

TextBook(s):

1."Software engineering A practitioner's Approach", Roger S. Pressman, McGraw HillInternationalEducation,SeventhEdition,2016.

ReferenceBook(s):

1. IanSommerville,'SoftwareEngineering',SixthEdition,PearsonEducation,(2001).
2. JimArlow,IlaNeustadt,"UML2andtheUnifiedProcess:PracticalObject-OrientedAnalysisandDesign",2ndEdition,Pearson,(2005).
3. FundamentalsofSoftwareEngineering, FourthEdition, RajibMall,PHI
4. SoftwareEngineering,PrinciplesandPractices, DeepakJain,OxfordUniversityPress.
5. SoftwareEngineeringFoundations,YingxuWang, AuerbachPublications,2008.
6. SoftwareEngineeringPrinciplesandPractice, HansVanVliet,3rdedition,JohnWiley&SonsLtd.

Online/WebResources:

1. http://www.acadmix.com/eBooks_Download
2. http://www.freetechbook.com/software-engineering-f15.htmlhttp://www.nptel.iitm.ac.in/courses/Webcourse-contens/IITKharagpur/SoftEngg/
3. http://www.Computer.org/portal/wen/swebok
4. http://www.softwareengineerinsider.com/articles/what-is-software-engineering.html
5. http://www.tutorialspoint.com/software_engineering

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC205	OBJECTORIENTEDPROGRAMMINGTHROUGH JAVALAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	4	36	2	40	60	100

Pre-requisite: BasicProgrammingLanguageslikeCandC++

CourseObjectives:

1. Tointroducejavacompiler andeclipseplatform.
2. Toimparthandonexperiencewithjavaprogramming.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandfundamentalsofobject-oriented programminginJava,includingdefining classes,invokingmethods,using classlibraries,etc.
CO2	ExploreJavaInheritance,Interfacesandtocreateand usepackages
CO3	Understand the role of I/O Streams and how to establish the communication throughnetworking in java. Apply Exception Handling mechanisms and Multithreading forapplicationdevelopment.
CO4	Designanddevelopcomplexuserinterfaceapplicationsusing AWT,Applets&Swings.Workwith GUI,Eventhandlingmechanism.

CO-POMapping													
CO	**PO**											**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	2	3	1								1	2	2
CO2	1	3	3	1								2	2	2
CO3	1	3	3	2								2	3	3
1-Low,2-Medium, 3- High														

COURSECONTENT	CO
Task1	
1. Use Eclipse or Netbean platform and acquaintwith the various menus.Create atest project, add a test class and run it. See how you can use auto suggestions, autofill.Trycodeformatterandcoderefactoringlikerenamingvariables,methodsand classes. Try debug step by step with java program to find prime numbers between1ton.	CO1
Task-2	
1. WriteaJava programthat printsallrealandimaginarysolutionsto thequadraticequationax2+bx+c=0.Readina,b,candusethequadraticformula. 2. WriteaJavaprogramforsortingagivenlistofnamesinascendingorder 3. Writeajavaprogramtoacceptastringfromuseranddisplaynumberofvowels,consonant s, digits and special characters present in each of the words of the giventext.	CO1
Task-3	

1. Writeajavaprogramtomakerollingapairofdice10,000timesandcountsthenumberoftimesdoublesofarerolledforeachdifferentpairofdoubles. *Hint:Math.random()* 2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive.As each number is read display it only if it's not a duplicate of any numberalready read display the complete set of unique values input after the user enterseachnewvalue. 3. Write a java program to read the time intervals (HH:MM) and to compare systemtime if the system time between your time intervals print correct time and exitelsetryagaintoreputethesamething.ByusingStringToknizerclass	CO2
TASK-4	
1. Write a java program to split a given text file into n parts. Name each part as thenameoftheoriginalfilefollowedby.part<n>wheren isthesequencenumber ofthe partfile. 2. WritejavaprogramtocreateasuperclasscalledFigurethatreceivesthedimensions of two dimensional objects. It also defines a method called area thatcomputestheareaofanobject.TheprogramderivestwosubclassesfromFigure. The first is Rectangle and second is Triangle. Each of the sub class overriddenarea()sothatitreturnstheareaofarectangleandatrianglerespectively.	CO2
TASK-5	
1. WriteaJavaprogramthatcorrectlyimplementsproducerconsumerproblemusingthe conceptofinterthreadcommunication 2. Writeajavaprogramtofindandreplacepatterningivenfile, 3. Useinheritancetocreateanexceptionsuperclasscalled EexceptionAandexception sub class ExceptionB and ExceptionC, where ExceptionB inherits fromExceptionA and ExceptionC inherits from ExceptionB. Write a java program todemonstratethatthecatchblockfortypeExceptionAcatchesexceptionoftype ExceptionBandExceptionC	CO3
TASK-6	
1. WriteajavaprogramtoconvertanArrayListtoanArray. 2. WriteaJavaProgramforwavingaFlagusingAppletsandThreads	CO3
TASK-7	
1. Write a Java Program for stack operation using Buttons and JOptionPane input andMessage dialogbox. 2. Write a Java Program to Addition, Division, Multiplication and substraction usingJOptionPane dialogBoxandTextfields.	CO4
TASK-8	
1. WriteaJavaProgramfortheblinkingeyesandmouthshouldopenwhileblinking. 2. ImplementaJavaProgramtoaddanewballeachtimetheuserclicksthemouse.Provided amaximumof20ballsrandomlychooseacolorforeachball.	CO4
TASK-9	
1. Suppose that a table named Table.txt is stored in a text file. The first line in the fileistheheader,andtheremaininglinescorrespondtorowsinthetable.Theelements are eparated by commas. Write a java program to display the table usingJtable component 2. Write a program that creates a user interface to perform integer divisions. The userenterstwonumbersinthetextfields,Num1andNum2.ThedivisionofNum1and	CO4

Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw aNumberFormatException. If Num2 were Zero, the program wouldthrow anArithmeticExceptionDisplaythe exceptioninamessage dialog box.	
TASK-10	
1. WriteaJavaProgramto implementtheopening ofadoorwhile openingmanshould presentbeforehutand closingmanshoulddisappear. 2. WriteaJavacodebyusingJtextFieldtoreaddecimalvalueandconvertingadecimalnumberintobinarynumberthenprintthebinaryvalueinanother JtextField	CO4
TASK-11	
1. Write a Java program that works as a simple calculator. Use a grid layouttoarrangebuttons forthedigitsandforthe+,-,*,%operations. Addatextfieldtodisplaytheresult. 2. WriteaJavaprogramfor handlingmouseevents.	CO4

AdditionalExperiments:	
TASK-12	
1. WriteaJavaProgramforBouncingBall(Theballwhile movingdownhastoincrease the size anddecrease thesize whilemovingup) 2. Write a java program establish a JDBC connection, create a table student withpropertiesname,registernumber,mark1,mark2,mark3.Insertthevaluesintothetablebyusingthejavaanddisplaytheinformationofthestudentsatfrontend.	CO4

TextBook(s):

1. Herbert Schildt, "The Complete Reference Java", Tata McGraw-Hill, 10thEdition,2017.
2. Dr. R.NageswaraRao,"CoreJavaAnIntegratedApproach",Dreamtech Press.

ReferenceBook(s):

1. ObjectOrientedProgrammingwithJava,B.EswaraReddy,T.V.SureshKumar,P.Raghavan,Pearson-Sanguine
2. T.Budd"UnderstandingObject-OrientedProgrammingwithJava", updatededition,PearsonEducation.
3. CayS.Horstmann,"CoreJavaVolume–1Fundamentals",PearsonEducation.
4. Sagayaraj, Dennis, Karthik and Gajalakshmi, "Java Programming for core and advancedlearners" UniversityPress
5. Y.DanielLiang,"IntroductiontoJavaprogramming",PearsonEducation.
6. P.RadhaKrishna,"ObjectOrientedProgrammingthroughJava", UniversityPress.
7. S.Malhotra,S.Chudhary,"ProgramminginJava",2ndedition,OxfordUniv.Press.
8. R.A.Johnson, "JavaProgrammingandObject-orientedApplicationDevelopment",Cengage Learning.

OnlineReference

1.https://www.academia.edu/40222417/Java_The_Complete_Reference_Eleventh_Edition_by_Herbert_Schildt

WebResources:

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://www.javatpoint.com/java-tutorial
3. https://www.w3schools.com/java/
4. https://www.tutorialspoint.com/java/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC206	PYTHONPROGRAMMINGLAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	36	1.5	40	60	100
Pre-requisite:Nil								

CourseObjectives:

1. Learntowritepythonprogramsfordifferentstandardtasks
2. Understandtheconceptsofpython,developprogramsandanalyzehowitworks
3. Get ideaon writing programsforvarioustasksusing differentsyntax and availablefunctionsinpythonlanguage
4. Recognizewiththeconceptsoftuplesanddictionariesinpythonlanguage

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:	
CO1	Writepythonprogramsfordifferentstandardtasks.**(BL-1)**
CO2	Writepythonbasicprogramsusingconditionalandloopingstructures.**(BL-1)**
CO3	Executeprograms inpythonforfunctions,createmodulesandwork withpackages.**(BL-3)**
CO4	Executeprogramsoncreationoflists,tuplesanddictionariesusingpython.**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	2										3	3
CO2	2	1	3										1	1
CO3	1	1	1	2									1	1
CO4	2	3	3		1								3	3

COURSECONTENT

TASK–1 **CO1**

1. (a)PythoninstallationforWINDOWS/LINUX
   (b)Workingwithinteractiveandscriptmodes inIDLE

2. Developprograms
   (a) Toexchangethevaluesoftwo variables
   (b) Tofindfactorialofagivennumber
   (c) Tofindthesumofsetofnumbers

OBJECTIVE:

1. Learnpythoninstallationforvariousplatforms**(BL-2)**
2. WorkingwiththeIntegratedDevelopmentEnvironmentofPython.**(BL-3)**
3. Developbasicprogramsusingpython**(BL-6)**

TASK-2 **CO2**

3. Developprograms
   (a) Tocomputesinefunction
   (b) TogenerateFibonaccisequence
   (c) Toreversethedigitsofanumber

4. WritePythonscripts
   (a) Toreadtwonumbersandperformanarithmeticoperationbasedonthe optionchosenbytheuser.
   (b) Tofindthegradeofastudentbasedonthemarksgivenforallsubjects inasemester

OBJECTIVE:

1. Writeprogramsinpythonforcomputingsinefunction,Fibonaccisequenceetc.**(BL-1)**
2. Developprogramsinpythonusingoperatorsandexpressions**(BL-6)**

TASK-3 **CO3**

5. (a)Writeaprogramtogenerateamultiplicationtablefora givennumber

(b) Write a program using loop that asks the user to enter an even number. If the numberentered is not even then display an appropriate message and ask them to enter a numberagain.Donotstopuntilaneven numberisentered.Printa Congratulatorymessageatend

6. WritefunctionsinPython

(a) Tofindtheareaofacircle
(b) Tofindthefactorialofanumberusingrecursion

OBJECTIVE:

1. Designmultiplicationtablefor agivennumber**(BL-6)**
2. Writeprogramsusingfunctionsthatsolvevariouspurposes**(BL-1)**

TASK-4 **CO4**

7. Considerthestringstr=”GlobalWarming”.Writestatements inPythontoimplementthefollowing
(a) Todisplaythelastfourcharacters.
(b) Todisplaythesubstringstartingfromindex4andendingatindex8.
(c) Tocheckwhetherstringhasalphanumericcharacters ornot.
(d) Totrimthelastfourcharactersfromthestring.
(e) Totrimthefirstfourcharactersfromthestring.
(f) Todisplaythestartingindexforthesubstring“Wa”.
(g) Tochangethecaseof the givenstring.
(h) Tocheckif thestringisintitlecase.
(i) Toreplacealltheoccurrencesofletter“a”inthestringwith“*”

8. Writeaprogramtofindthesumof twomatricesusinglists.

OBJECTIVE:

1. Createastringandapplyvariousstringmethodsonthat**(BL-6)**
2. Learnhowtoimplementlistsanditsusage**(BL-2)**

TASK-5 **CO4**

9.Createalistthatcontains thenames of5studentsofyourclass.(Donotaskforinput todoso)
(i) Printthelist
(ii) Asktheusertoinputonenameandappendittothe list
(iii) Print thelist
(iv) Askusertoinputanumber.Printthenamethathasthenumberasindex(Generateerrormessageif thenumberprovidedismorethanlastindexvalue).
(v) Add“Kamal” and“Sanjana” atthebeginningof thelistbyusing“+”.
(vi) Print thelist
(vii) Asktheusertotypeaname.Check whetherthatnameis inthelist.Ifexist,deletethename,otherwiseappenditattheendof thelist.
(viii) Createacopyofthelistinreverse order
(ix) Printtheoriginallistandthereversedlist.
(x) Removethelastelementofthelist.

OBJECTIVE:

1. Createaclassroomlistandapplyvariousoperationsonthelist**(BL-6)**
2. Applythelistoperationsandreversethelist**(BL-3)**

ADDITIONALEXPERIMENTS:TASK-6 **CO4**

10. Write a python program to create telephone directory. Input 10 names and phone numbers tostoreitinadictionaryanddothefollowing:
(a) Inputanynameandprintthephonenumberofthatparticularname.
(b) Addanewcontact
(c) Updateanexistingcontact
(d) Deleteacontact
(e) Sortthedirectoryaccordingtonames.

11. Writeaprogramtoinput‘n’employees’salaryandfindminimum&maximumsalaryamong‘ n’employeesusingTuples.

OBJECTIVE:

1. Createatelephonedirectoryandstorevariousdetailsusingdictionaries**(BL-6)**
2. CreateemployeedetailsandworkonitusingTuples**(BL-6)**

Totalhours:	**36hours**

VirtualLabs:

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/python-basics/experiments/arithmetic-operations-iitk/
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/python-basics/experimentlist.html

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Pythoninstallation	CO1	https://www.javatpoint.com/how-to-install-python
2	PythonOperators	CO2	https://www.javatpoint.com/python-operators
3	Pythonfunctions	CO3	https://www.javatpoint.com/python-functions

TextBook(s):

1. PythonProgramming–AnIntroductiontocomputerscience,JohnZelle,JimLeisy
2. ProgrammingandProblemSolvingwithPythonby AshokNamdevKamthaneand AmitAshokKamthane,McGrawHillEducation;Firstedition(1November2017)

ReferenceBook(s):

1. ProgrammingPython,MarkLutz, O'Reilly,3rdEdition, 2006
2. CorePythonProgramming,WesleyJ Chun,PH,2ndEdition
3. PythonProgramming:ACompatibleGuideforBeginnerstoMasterandBecomeanExpertinpythonprogramming Language,BrainDraper,CreateSpaceIndependentPublishingPlatform,2016

Online/ WebResources:

1. http://www.freebookcentre.net/Language/Free-Python-Books-Download.html
2. https://www.pdfdrive.com/python-programming-books.html3.https://nptel.ac.in/courses/106/106/106106182/
4. https://www.javatpoint.com/python-tutorial
5. https://www.python.org/about/gettingstarted/
6. https://www.tutorialspoint.com/python/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC207	ArtificialIntelligenceLab							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	36	1.5	40	60	100
Pre-requisite: AnyOOPProgrammingLanguage								
CourseObjectives: 1. Learnabout basicAIfundamentalsandAIproblems. 2. Studentswillgainanunderstandingaboutsearching. 3. Understandabout AIknowledge 4. Examinethefundamentalsandterminologiesofexpertsystem. 5. IdentifyandDevelopsimpleapplicationsmakinguseofExpertSystemTools.								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	StateapplicationsofArtificialIntelligence							
CO2	EnumerateproblemsolvingstrategiesinAI							
CO3	Illustrateproblemreductiontechniques							
CO4	Applyknowledgerepresentationtechniquestosolverealworldproblems							
CO5	ApplyComputationalIntelligencetechniquestosolvereal-worldproblems							

CO-POMapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2		1											2
CO2	2	2	2										2	3
CO3	3	3	3	2									3	3
CO4	3	2	3	3	2								3	2
CO5	3	2	3	2	2								2	
1:Low,2-Medium,3-High														

COURSECONTENT	CO
Task-1	
Installthepythonsoftware/Anaconda-pythonandinstallusefulpackageandinstall NLTKsoftware.	CO1
Task-2	
a. Writeapythonprogramtoprintthemultiplicationtableforthegivennumber? b. Writeapythonprogramtocheckwhetherthegivennumberisprimeornot? c. Writeapythonprogramtofindfactorialofthegivennumber?	CO2
Task-3	
Writeapythonprogramto implementsimpleChatbot?	CO2
TASK-4	
a.Writeapythonprogramtoimplement Listoperations(NestedList, Length,Concatenation,Membership,Iteration,IndexingandSlicing)? b.Writeapythonprogramtoimplement Listmethods (Add, Append,Extend&Delete).	CO3
TASK-5	
a. WriteapythonprogramtoIllustrateDifferentSetOperations? b. WriteapythonprogramtogenerateCalendarfor thegivenmonthandyear?	CO2

TASK-6	
Writeapythonprogramtoimplement SimpleCalculatorprogram?	CO2
TASK-7	
a. WriteapythonprogramtoAddTwoMatrices. b. WriteapythonprogramtotransposeaMatrix.	CO3
TASK-8	
WriteapythonprogramtoimplementBreadthFirstSearchTraversal	CO4
TASK-9	
WriteapythonprogramtoimplementWater JugProblem	CO4
TASK-10	
a. Writeapythonprogramtoremovepunctuationsfromthegivenstring? b. Writeapythonprogramtosortthesentenceinalphabeticalorder?	CO4 CO5
TASK-11	
WriteaprogramtoimplementHangmangameusingpython.	CO5
TASK-12	
WriteaprogramtoimplementTic-Tac-Toegameusingpython.	CO5

AdditionalExperiments:	
TASK-13	
a. Writeapythonprogramtoremovestop words foragivenpassagefromatextfileUsingNLTK? b. WriteapythonprogramtoimplementstemmingforagivensentenceusingNLTK? c. WriteapythonprogramtoPOS (PartsofSpeech) taggingfor thegivesentenceusing NLTK	CO5
TASK-14	
a. WriteapythonprogramtoimplementLemmatizationusing NLTK? b. WriteapythonprogramtoforTextClassificationfor thegivesentenceusingNLTK?	CO5

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Prolog	CO1	https://www.youtube.com/watch?v=hBz3DgXlg0Q
2	ArtificialIntelligence	CO1	https://www.youtube.com/watch?v=JMUxmLyrhSk&=527s
3	ExpertSystems	CO2	https://www.youtube.com/watch?v=l0CRFuA0m_8&=37s

TextBook(s):

1. ThinkPython, HowtoThinkLikeaComputer Scientist, Version2.0.17, AllenDowney,GreenTeaPress.
2. ArtificialIntelligenceaModernApproach, StuartRussell, PeterNorvig(Person

Education),2nd edition. 3.NilsJ.Nilsson,"Artificial Intelligence:AnewSynthesis",HarcourtAsiaPvt.Ltd.,2000
ReferenceBook(s): 1. PythonEssentialReference,DavidM.Beazley,PearsonEducation,Inc. 2. FluentPython,LucianoRamalhobyO'ReillyMedia 3. PythonCookbook,DavidBeazleyandBrianK.Jones,O'ReillyAtlas.3e 4. ArtificialIntelligence-RichE&KnightK (TMH),4thedition. 5. ArtificialIntelligenceStructuresandStrategiescomplexproblemSolving– GeorgeF.LugarPearsonEducation.
Web References:https://www.youtube.com/watch?v=l0CRFuA0m_8&t=121shttps://www.youtube.com/watch?v=OVZUKXxMzSEhttps://www.youtube.com/watch?v=Hor5r8bz8SA

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC210	MADWITHANDROID							R20
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100
Pre-requisite:ACourseon"JavaProgrammingandBasicsofXML".								

CourseObjectives:

1. UnderstandAndroidhistoryanditsfundamentalsandknowthebuildingblocksofandroid.
2. Getideaonthecreationofandroiduserinterfaceanditstestingmechanisms.
3. Illustrate the various components, layouts and viewsincreatingandroidapplications.
4. ToimprovestheirskillsofusingAndroidsoftwaredevelopmenttools.
5. Todemonstratetheirabilitytodevelopsoftwarewithreasonablecomplexityonmobile platform.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Identifyasignificantprogrammingcomponent,involvingthesensorsandhardware featuresofmobiledevice.**(BL-2)**
CO2	DemonstratetheuseofAndroidsoftwaredevelopmentcontrols.**(BL-2)**
CO3	ConstructmobileapplicationsontheAndroidPlatformusingdifferentlayoutsfor playingvideoandaudio.**(BL-3)**
CO4	AcquiretheInformationUsingDialogsandFragmentsbythemobileapplications fortheAndroidoperatingsystem.**(BL-3)**
CO5	PreparemobileapplicationsinvolvingMenusandActionBars.**(BL-3)**
CO6	Demonstrateapplicationswithnetworkconnectivityandmessaging.**(BL-2)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		1	1		1							1	1	1
CO2	1	2	2		2							2	2	1
CO3	1	2	2		3							2	3	3
CO4	1	3	3		3							2	3	3
CO5	1	2	3		3							3	3	3
CO6	1	3	3		3							3	3	3

1:Low,2-Medium,3-High

COURSECONTENT

MODULE –1	IntroductiontoAndroid OperatingSystem	Hours:12

Introduction to Android Operating System: Android OS design and Features–Androiddevelopment framework, SDK features, Installing and running applications on Eclipse platform,CreatingAVDs,TypesofAndroidapplications,BestpracticesinAndroidprogramming,Androidtools.

Android application components – Android Manifest file, Externalizing resources like values,themes,layouts,Menusetc.,Resourcesfordifferentdevicesandlanguages,RuntimeConfigurationChangesAndroidApplicationLifecycle–Activities,Activitylifecycle,activity

states,monitoringstatechanges.**(5h)**

AttheendoftheModule1,studentswillbeableto:

1. DefinefeaturesandOSdesignofANDRIOD
2. IllustratetypesofAndroidApplications
3. ExplainAndroidApplicationComponents

MODULE-2	AndroidUserInterface	Hours:10

Android User Interface: Measurements – Device and pixel density independentmeasuringunits Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – EditableandnoneditableTextViews,Buttons,RadioandToggleButtons,Checkboxes,Spinners,Dialogandpickers.

Event Handling – Handling clicks or changes of various UI components Fragments – Creatingfragments,Lifecycleoffragments,Fragmentstates,AddingfragmentstoActivity,adding,removing and replacing fragments with fragment transactions,interfacing between fragmentsandActivities,Multi-screenActivities.

AttheendoftheModule2,studentswillbeableto:

1. Defineandroiduser interface measurements.
2. Listlayouts,Components,Eventhandling.
3. Createfragments.

MODULE-3	IntentsandBroadcasts	Hours:10

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting newActivity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions,using Intent to dial a number or to send SMS Broadcast Receivers – Using Intentfilters toservice implicit Intents, Resolving Intent filters, finding and using Intents received within anActivityNotifications – Creatingand Displayingnotifications,Displaying Toasts.

AttheendoftheModule3,studentswillbeableto:

1. UseIntentstoLaunchActivities.
2. DiscussSMSbroadcastreceivers.
3. Creatinganddisplayingnotifications.

MODULE-4	BuildingMenus	Hours: 10

Building Menus: Creating Interface Menus and Action Bars, Menus and Their Types, CreatingMenus Through XML, Creating Menus Through Coding, Applying a Context Menu to a ListView, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed ActionBar,CreatingaDrop-DownListActionBar.

AttheendoftheModule4,studentswillbeableto:

1. Createinterfacemenusandactionbars.
2. Createlistsandactionbars.
3. Replaceamenuwithactionbar.

MODULE-5	PersistentStorage	Hours: 10
Persistent Storage: Files – Using application specific folders and files, creating files, readingdata from files, listing contents of a directory Shared Preferences – Creating shared preferences,savingandretrievingdata usingSharedPreference. **Database –** Introduction to SQLite database, creating and opening a database, creating tables,inserting retrieving and deleting data, Registering Content Providers, Using content Providers(insert,delete,retrieveandupdate).		
AttheendoftheModule5,studentswillbeableto: 1. Illustratepersistentstorageoffiles. 2. DefineSQLiteDatabase. 3. Usedatabasetocreate,insert,retrieveanddeletedata.		
MODULE-6	**Alarms**	**Hours:8**
CreatingandusingalarmsUsingInternetResources–Connectingtointernetresource,using downloadmanagerLocationBasedServices– FindingCurrentLocationandshowinglocationontheMap,updatinglocation.		
AttheendoftheModule6,studentswillbeableto: 1. CreatealarmsusingInternetResources. 2. DesignFindingcurrentlocation,showinglocation,updatinglocation		
Totalhours:		**60hours**

Contentbeyondsyllabus:

1. IntroductiontoIOS.
2. WindowsMobileAppDevelopment.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	AndroidOSdesignand Features	CO1	https://www.tutorialspoint.com/android/android_overvietm
2	Lifecycleoffragments	CO2	https://www.tutorialspoint.com/android/android_fragmehtm
3	Displaying Toasts	CO3	https://www.javatpoint.com/android-toast-example
4	ReplacingaMenuwith theActionBar	CO4	https://www.journaldev.com/9357/android-actionbar-example-tutorial
5	IntroductiontoSQLite database	CO5	https://www.tutorialspoint.com/sqlite/index.htm
6	Creating and usingalarms Using InternetResources	CO6	https://www.tutorialspoint.com/how-to-implement-alarmmanager-in-android

TextBook(s):

1. ProfessionalAndroid4ApplicationDevelopment,RetoMeier,WileyIndia,(Wrox),2012
2. AndroidApplicationDevelopmentforJavaProgrammers,JamesCSheusi,Cengage•Learning,2013.
3. AndroidProgramming byB.MHarwani, PearsonEducation, 2013.

ReferenceBook(s):

1. BeginningAndroid4ApplicationDevelopment,Wei-MengLee,WileyIndia(Wrox),2013
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz.,Dreamtech.3
3. ProfessionalAndroid4applicationsdevelopment,RetoMeier,WileyIndia,2012.
4. BeginningAndroid4applicationsdevelopment,Wei- MengLee,WileyIndia,2013
5. PawPrints Learning Technologies, Beginning Android Development: Create Your OwnAndroidApps Today,2014.
6. ErikHellman,AndroidProgramming: PushingtheLimits,John Wileyandsonsltd,2014.
7. NeilSmyth,AndroidStudioDevelopmentEssentials.
8. JosephAnnuzzi,Jr,LaurenDarcey,IntroductiontoAndroidApplicationDevelopment,Addison-Wesley,FourthEdition.

OnlineResources:

1. http://www.tutorialspoint.com/android/index.htm
2. http://developer.android.com/training/index.html

WebReferences:

1. https://www.tutorialspoint.com/android/android_overview.htm
2. https://www.tutorialspoint.com/android/android_fragments.htm
3. https://www.javatpoint.com/android-toast-example
4. https://www.journaldev.com/9357/android-actionbar-example-tutorial
5. https://www.tutorialspoint.com/sqlite/index.htm
6. https://www.tutorialspoint.com/how-to-implement-alarm-manager-in-android

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC211	CLOUDCOMPUTING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

- Thestudentwilllearnaboutthecloudenvironment.
- Buildingsoftwaresystemsand
- AppliesthevariouscloudservicemodelsincludingIaas,Paas,Saas,
- TounderstandthetechniquesofCloudProgrammingandSoftwareEnvironments.
- TostudytheconceptsofCloudResourceManagementandScheduling.
- Tounderstandthebasicconceptsof StorageSystems.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	UnderstandthekeydimensionsofthechallengeofCloudComputing
CO2	Assessmentoftheeconomics,financial,andtechnologicalimplicationsfor selectingcloud computingforownorganization
CO3	Assessingthefinancial,technological,andorganizationalcapacityofemployer'sforactively initiatingandinstallingcloud-basedapplications.
CO4	Assessmentofownorganizations'needsforcapacitybuildingandtraininginCloudcomp uting-relatedIT areas
CO5	Assessment ofCloudresourcesmanagementandschedulingofthecloudresources.
CO6	Reducethestoragemediasystemstolimitedresources.

CO-POMapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2										1	
CO2	1	2	1											1
CO3	1		2	1										2
CO4	1	2		3									1	
CO5		1	2											2
CO6	1	2											1	

1:Low,2-Medium,3-High

COURSE CONTENT

MODULE–1	FundamentalCloudComputing	8Hours

Fundamental Cloud Computing-Understanding Cloud Computing, Origins influences, Basic Concepts andTerminology,Goals,Benefits,risks,Challenges,Rollsandboundaries,Cloudcharacteristics,CloudDelivery models,Clouddeploymentmodels.**(9Hrs)**

AttheendoftheModule1,studentswillbeableto:

1. Analyzethecomponentsofcloudcomputinganditsbusinessperspective.
2. Evaluatethevariousclouddevelopment tools.
3. Utilizetheresourcemanagementinthecloud.

MODULE-2	Systemsmodeling,Clusteringandvirtualization:	8Hours

Systems modeling, Clustering and virtualization: Scalable ComputingovertheInternet,TechnologiesforNetworkbasedsystems,Systemmodels forDistributed andCloudComputing,SoftwareenvironmentsfordistributedsystemsandClouds,Performance,Security AndEnergyEfficiency.**(10Hrs)**

AttheendoftheModule2,studentswillbeableto: 1. DiscusstheuseofInternetandNetworksystems. 2. IdentifytheuseofSystemmodelsforDistributedandCloudComputing. 3. Understandtheuse ofClouddatainreal-timeworld.		
MODULE-3	**VirtualMachines andVirtualization**	**8Hours**
VirtualMachinesandVirtualizationofClustersandDataCenters: ImplementationLevelsofVirtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/ODevices,VirtualClustersandResourceManagement,VirtualizationforDataCenterAutomation. **(10Hrs)**		
AttheendoftheModule3,studentswillbeableto: 1. ImplementtheLevelsofVirtualizationincloud. 2. UnderstandtheuseofVirtualizationStructures/Toolsandmechanisms.VirtualizetheCPU,MemoryandI/ODeviceusingdatacentres.		
MODULE-4	**CloudPlatformArchitecture**	**8Hours**
CloudPlatformArchitecture: CloudComputingandserviceModels, ArchitecturalDesignofComputeand Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security andTrustManagement.ServiceOrientedArchitecture, MessageOrientedMiddleware.		
AttheendoftheModule4,studentswillbeableto: 1. UnderstandtheCloudservicemodels. 2. AnalyzetheCloudResource,CloudSecurityandTrustManagement. 3. UnderstandtheuseofServiceOrientedArchitectureinCloud.		
MODULE-5	**CloudProgrammingandSoftware Environments**	**8Hours**
CloudProgrammingandSoftwareEnvironments: FeaturesofCloudandGridPlatforms,Parallel &DistributedProgrammingParadigms,ProgrammingSupportofGoogleAppEngine,ProgrammingonAmazon AWSandMicrosoftAzure,EmergingCloudSoftwareEnvironments.		
AttheendoftheModule5,studentswillbeableto: 1. Understandthecloudprogrammingandsoftwareenvironment. 2. Analyzethedifferentcloudplatformsusedfordatastorage. 3. IdentifytheEmergingCloudSoftwareEnvironments.		
MODULE-6	**StorageSystems**	**8Hours**
StorageSystems: Evolutionofstoragetechnology,storagemodels,filesystems anddatabase,distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore,AmazonSimpleStorageService(S3).**(9Hrs)**		
AttheendoftheModule6,studentswillbeableto: 1. TounderstandthefeaturesofStoragesystemsincloud. 2. UnderstandtheuseofApacheservicesincloud.		
	Totalhours:	**59hours**

Termwork: Neweraofcomputingthelargeclouddataoncloudmachines.
Contentbeyondsyllabus: 1. CloudDatasecurityusingcryptographictechniques.

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Systemmodelsfor DistributedandCloud Computing	CO1	https://www.youtube.com/watch?v=VNRmsACNSaY
2	VirtualizationofCPU, MemoryandI/O Devices	CO2	https://www.youtube.com/watch?v=1CsC5aa0Zek
3	CloudComputingand serviceModels	CO3	https://www.youtube.com/watch?v=d7EI8B7jTrI
4	Programming onAmazonAWSan dMicrosoft Azure	CO4	https://www.youtube.com/watch?v=KWxTx7JlWLo
5	SchedulingAlgorithms for ComputingClouds	CO5	https://www.youtube.com/watch?v=WEqY5kRk-g0
6	ApacheHadoop	CO6	https://www.youtube.com/watch?v=NLeWaH6O-TE

TextBook(s):

DistributedandCloudComputing, KaiHwang,GeoffryC.Fox,JackJ.DongarraMKElsevier.CloudComputing,TheoryandPractice,DanCMarinescu,MKElsevier.
CLOUDCOMPUTINGPrinciplesandParadigms,RajkumarBuyya,James Broberg,AndrzejGoscinski

ReferenceBook(s):

Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH.MasteringCloudComputing,FoundationsandApplicationProgramming,RajKumar Buyya, Christenvecctiola, STammaraiselvi,TMH.

OnlineResources:

1.https://www.tutorialspoint.com/cloud_computing/index.htm

Web Resources:https://www.tutorialspoint.com/cloud_computing/index.htmhttps://www.tutorialspoint.com/cloud_computing/index.htmhttps://www.tutorialspoint.com/cloud_computing/index.htmhttps://www.tutorialspoint.com/cloud_computing/index.htmhttps://www.tutorialspoint.com/cloud_computing/index.htm
https://www.tutorialspoint.com/cloud_computing/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC212	DISTRIBUTEDCOMPUTING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:OperatingSystems,ComputerNetworks

CourseObjectives:

1. TolearnaboutbasicmodelsofDistributedcomputing
2. Understandthealgorithmsforcommunicationindistributedsystems
3. Understandtheunderlying algorithms forsynchronizationindistributedsystems.
4. Todesignalgorithms forhandlingdeadlocks
5. Tobeabletoanalyzefailuresindistributedsystems

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandmodelsofdistributedcomputing. (BL-2)
CO2	Analyzealgorithmsforcommunicationindistributedsystems.(BL-4)
CO3	Analyzealgorithmsforterminationdetectionandsynchronizationindistributed systems.(BL-4)
CO4	Analyzedistributedsharedmemorymodels.(BL-4)
CO5	Designdistributedalgorithmsforhandlingdeadlocks.(BL-6)
CO6	Analyzefailuredetectionindistributedsystems.(BL-4)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2						2						1
CO2	3	3			1				1				1	
CO3	3	2				2							1	
CO4	2	3			2								1	
CO5	3	3		2									2	
CO6	2	2			1								1	

1:Low,2-Medium, 3-High

COURSECONTENT

MODULE –1	Introduction	8Hours

DistributedComputingIntroduction:Definition,Relationtoparallelsystems,synchronousvsasynchronousexecution,designissues andchallenges.
AModelofDistributedComputations:AModelofdistributedexecutions,Modelsof communicationnetworks,Globalstateofdistributedsystem,Modelsofprocesscommunication.

At theendofthe Module1,studentswillbe ableto:

1. Understand variousdistributedsystemmodels
2. Studythedesignissuesandchallengesindistributedcomputing
3. Understandvarious modelsofprocesscommunication

MODULE-2	CommunicationinDistributedSystems	8Hours

Messageorderingandgroupcommunication:Messageorderingparadigms,Groupcommunication, Causal order(CO), Total order,Multicast,Propagation treesformulticast,Application-levelmulticastalgorithms,Fault-tolerantgroupcommunication,Multicastalgorithmsatthenetworklayer

At theendofthe Module2,studentswillbeableto:

1. Examinethegroupcommunicationindistributedarchitecture
2. Analyzethealgorithmsforapplicationlevelmulticast
3. Examinethe multicast algorithmsatthenetworklayer

MODULE-3	TerminationdetectionandsynchronizationinDistributed Systems	8Hours

Terminationdetection:Systemmodel of adistributedcomputation,Termination detectionusingdistributedsnapshots,weightthrowingandspanning-tree-basedalgorithms,Message-optimal termination detection, Termination detection in a very general distributed computingmodel,Termination detectionin theatomiccomputationmodel,Termination detection in afaultydistributedsystem

Logical Time: Logical clocks, scalar time, vector time, Matrix time, virtual time, Physical clocksynchronization-NTP

At theendoftheModule3,studentswillbeableto:

1. Studytheterminationdetectionusingdistributedsnapshots
2. Analyzethespanningtreebasedalgorithms
3. Studythesynchronizationusinglogicalclocks

MODULE-4	DistributedSharedMemory	8Hours

Distributedsharedmemory:Abstractionandadvantages,Memoryconsistencymodels,Sharedmemorymutualexclusion,Wait-freedom,Register hierarchyandwait-freesimulations,Wait-free atomic snapshotsofsharedobjects.

At theendofthe Module4,studentswillbeableto:

1. Examinethedistributedmemoryconsistencymodels
2. Illustrateonmutualexclusiontechniquesinadistributedenvironment
3. Understand theregisterhierarchyofshared objects

MODULE-5	HandlingDeadlocksinDistributedsystems	8Hours

Distributed mutual exclusion algorithms: Lamport's algorithm, Ricart–Agrawala algorithm,Quorum-basedmutual exclusion algorithms, Maekawa's algorithm, Token-based algorithms,Suzuki–Kasami'sbroadcastalgorithm.

Deadlock detection in distributed systems: System model, Models of deadlocks, Knapp'sclassificationofdistributeddeadlockdetectionalgorithms,MitchellandMerritt'salgorithmfor thesingleresourcemodel, Chandy–Misra–HaasalgorithmfortheANDmodel.

At theendofthe Module5,studentswillbeableto:

1. Learnthe distributedmutualexclusionandtokenbased algorithms
2. Implementthevarious modelsofdistributeddeadlockdetection
3. Illustrateonvariousalgorithms basedonresourcemodels

MODULE-6	Failuredetectionindistributedsystems	8Hours

Failuredetectors:Unreliablefailuredetectors,Theconsensusproblem,Atomicbroadcast,Asolutiontoatomicbroadcast,Theweakestfailuredetectorstosolvefundamentalagreement problems,Animplementationofafailuredetector,Anadaptivefailuredetectionprotocol**(9h)**

At theendofthe Module6,studentswillbeableto:

1. Understandpossiblereasons for failuresanddetectthem
2. Getto asolutionofatomicbroadcastand thefailuredetector
3. Implementanadaptivefailuredetectionprotocol

Totalhours:	**48hours**

Contentbeyondsyllabus:

1.Snapshotrecordingalgorithmsindistributedcomputing

Self-Study:

Contentstopromoteself-Learning:

S No	Topic	Reference
1	Introduction	https://www.slideshare.net/sunitasahu101/introduction-to-distributed-system-127420140https://www.slideshare.net/AlejandroCalderonMat/lesson 11-introduction-to-distributed-computing-v1b
2	Communication	https://www.tutorialspoint.com/message-passing-vs-shared-memory-process-communication-models https://www.slideshare.net/SHATHAN/communications-34089308
3	Synchronization	https://www.youtube.com/watch?v=aiJTAqu4gxshttps://8thlight.com/blog/rylan-dirksen/2013/10/04/synchronization-in-a-distributed-system.html
4	Distributedsharedmemory	https://www.tutorialspoint.com/algorithm-for-implementing-distributed-shared-memoryhttp://courses.cs.vt.edu/~cs5204/fall00/distributedSys/amento/dsm.html
5	Deadlocks	https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_deadlock_handling.htmhttps://www.slideshare.net/SaeedSiddik/deadlock-in-distribute-system-by-saeed-siddik
6	Failurerecovery	https://www.slideshare.net/mukeshits/distributed-systemsunit-4https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_failure_commit.htm

TextBook(s):

1. Ajay D. Kshemakalyani,Mukesh Singhal,DistributedComputing,Cambridge UniversityPress,2008.
2. AndrewS.Tanenbaum,MaartenVanSteen,DistributedSystems-PrinciplesandParadigms,PHI,2004.
3. DistributedComputing:Principles,Algorithms,andSystems.TextbookbyAjayD. Kshemkalyaniand MukeshSinghal.

ReferenceBook(s):

1. DistributedComputing:PrinciplesandApplicationsbyLiu.
2. DistributedComputing"bySunitaMahajanandSeemaShah.
3. ElementsofDistributedComputing"byVijayKGarg.
4. Distributed Computing:Fundamentals,SimulationsandAdvancedTopicsbyHagitAttiyaandJenniferWelch.
5. DistributedComputingSouthAsianEdition:Principles,Algorithms,andSystemsby

ProfessorAjayDKshemkalyaniandProfessorMukeshSinghal.

OnlineResources:

1.https://www.cs.uic.edu/~ajayk/DCS-Book

2. https://eclass.uoa.gr/modules/document/file.php/D245/2015/DistrComp.pdf
3. https://www.researchgate.net/publication/267091059_Distributed_Computing_Principles_Algorithms_and_Systems

WebReferences:

1.https://www.youtube.com/watch?v=dX2PSA0si5g2.
https://nptel.ac.in/courses/106/106/106106107/

3. https://www.tutorialspoint.com/Distributed-Systems
4. https://www.ejbtutorial.com/distributed-systems/introduction-to-distributed-systems

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC213	INFORMATIONRETRIEVALSYSTEMS							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

- Tolearnthedifferentmodelsforinformation storageandretrievalsystem
- To learn about the various retrieval utilities in retrieval system for efficientsearch
- Tounderstandtheretrieval utilities forimprovingthe clusteringefficiency
- Tounderstandabouthowdataisvisualizedatthetime ofpresentation
- Toexposethestudentsabout integrationofstructuredandtext data
- Tounderstandaboutthevarioustextsearchalgorithmandevaluationofinformationsystem

CourseOutcomes:Aftersuccessfulcompletionof thecourse,thestudentwillbeableto:

CO 1	Understanding of storageand retrieve of documents using appropriate models.(BL-2)
CO 2	Abilitytousethevariousretrievalutilitiesforimprovingsearchprocess.(BL-3)
CO 3	Understandingofretrievalutilitiesdocumentstoimprovespaceandtimeefficiencyby clustering.(BL-2)
CO 4	Understandingof visualization tools forinformation projection(BL-2)
CO5	Ableto perform integration ofstructured data with the additionaldata(Bl-3)
CO6	Analyze ofTextsearchAlgorithmsandInformationSystemEvaluation.(BL-4)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2		3	2								2	2	
CO2	1	2											2	
CO3	2	2	2	2									2	
CO4	2	2	2											
CO5				2									2	2
CO6	1			2										2

1: Low,2-Medium,3-High

COURSECONTENT

MODULE– 1	Introduction&Introduction toRetrievalStrategies	8Hours

UNIT– I:

Introduction:Definition,Objectives,FunctionalOverview,RelationshiptoDBMS,Digitallibrariesand DataWarehouses.

Introduction: Retrieval strategies: vectorspacemodel,Probabilisticretrievalstrategies: Simpletermweights, Non binaryindependencemodel,Language models.

Atthe endofthe Module 1, students willbeable to: 1.Learndifferentstoragesandrelationbetweendifferent Databases 2. Retrievingdatafromdifferent areas 3.Differentretrievalstrategiesin Retrievalsystem		
MODULE-2	**Retrievalutilities,CatalogingandIndexing**	**8Hours**
RetrievalUtilities:Relevancefeedback,Clustering,N-grams,Regressionanalysis,Thesauri. **CatalogingandIndexing:**Objectives,IndexingProcess,AutomaticIndexing,InformationExtraction.		
Atthe endofthe Module 2, students willbeable to: 1. Differentretrievalmethodsandhowtoextractdatafromthem 2. ImportanceofindexingProcess 3. DifferenttypesofindexinginIRS		
MODULE-3	**DocumentandTermClustering**	**8Hours**
RetrievalUtilities:Semanticnetworks,Parsing.Cross-LanguageInformationRetrieval:Introduction,Crossingthelanguagebarrier **Document and Term Clustering:**Introduction, Thesaurus generation, Item clustering, Hierarchyofclusters.		
Atthe endofthe Module 3, students willbeable to: 1. DifferenttypesofclustersinIRS 2. Differentretrievalutilitiesinthe databases 3. ImportanceofdocumentandTermClustering		
MODULE-4	**Efficiency&InformationVisualization**	**8Hours**
Efficiency: Invertedindex,Queryprocessing,Signaturefiles,Duplicatedocumentdetection **Information Visualization:**Introduction, Cognition and perception,Information visualizationtechnologies.		
Atthe endofthe Module 4, students willbeable to: 1. Efficiencyof InformationRetrievalSystem 2. Visualizationtechnologiesarelearned 3. Informationvisualizationmethodsarestudied		
MODULE-5	**IntegratedStructured DataandText**	**8Hours**
IntegratingStructuredDataandText:AHistoricalprogression,Information retrievalasarelationalapplication,Semi-structuredsearchusingarelationalschema.(9Hrs)		
Atthe end ofthe Module 5, students will beable to: 1. Analyzing ofsemistructureddataandretrievingfromrelationalschema 2. SemistructuredschemasinIRS 3. RelationalapplicationonIRS		
MODULE-6	**DistributedInformation Retrieval**	**8Hours**
Distributed Information Retrieval: A Theoretical model of distributed retrieval, Web search.**Text Search Algorithms:** Introduction, Software text search algorithms,Hardwaretextsearchsystems. **InformationSystemEvaluation:** Introduction,Measuresusedinsystemevaluation,Measurementexample–TREC results.		

Atthe endof theModule6, studentswill beable to: 1. Differentsearchalgorithmsandevaluationofalgorithms 2. Metricsusedfor evaluation 3. AnalysisofTRECin IRS	
Totalhours:	**48Hours**

Contentbeyondsyllabus:

1.HypertextDatastructure, 2.N-Gram Data Structures,3.RegressionAn alysis

Self-Study:

Contents topromoteself-Learning:

SNO	Topic	Reference
1	Vector Space Model	https://www.geeksforgeeks.org/web-information-retrieval-vector-space-model/https://www.datasciencecentral.com/profiles/blogs/information-retrieval-document-search-using-vector-space-model-in
2	RetrievalUtilities	https://www.tutorialspoint.com/natural_language_processing/natural_language_processing_information_retrieval.htmhttp://www.egyankosh.ac.in/bitstream/123456789/25567/1/Unit-3.pdf
3	AutomaticIndexing	http://www.authorstream.com/Presentation/nagalakshmimadar-1912014-irs-unit-iii-automatic-indexing/ https://www.slideshare.net/dhatchayaninandu/automatic-indexing
4	Clustering	https://www.cl.cam.ac.uk/teaching/1314/InfoRtrv/lecture6.pdf http://orion.lcg.ufrj.br/Dr.Dobbs/books/book5/chap16.htm
5	Cross language informationretrieval	https://en.wikipedia.org/wiki/Cross-language_information_retrievalhttps://en.wikipedia.org/wiki/Cross-language_information_retrieval

TextBook(s):

1. .DavidA.Grossman,OphirFrieder,InformationRetrieval– AlgorithmsandHeuristics,Springer,2nd Edition(DistributedbyUniversalPress), 2004
2. Kowalski,Gerald,MarkTMaybury:InformationRetrievalSystems:TheoryandImplementation, Kluwer AcademicPress, 1997.

ReferenceBook(s):

1. GeraldJKowalski,MarkT MayburyInformationStorageandRetrievalSystems:TheoryandImplementation, Springer, 2004.
2. SoumenChakrabarti,MiningtheWeb:DiscoveringKnowledgefrom

HypertextData,Morgan–KaufmannPublishers,2002.
3.ChristopherDManning,PrabhakarRaghavan,HinrichSchutze,AnIntroductiontoI nformationRetrievalByCambridgeUniversityPress,England,2009.

Online/WebResources:

1. https://www.springer.com/gp/book/9781402030031
2. https://www.springer.com/gp/book/9780792379249
3. www.tutorialpoint.com
4. www.sciencedirect.com
5. https://www.slideshare.net/BAIRAVIT/information-retrievalsystems-notes
6. https://lecturenotes.in/subject/367/information-retrieval-system-ir

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC214	OBJECTORIENTEDANALYSISANDDESIGN							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Objectorientedprogrammingconcepts.

CourseObjectives:

1. Understandtheconceptsofobjectorientedsystem, unifiedapproach.
2. Understandobjectorientedsystemdevelopment,methodologies.
3. DemonstrateUMLdiagrams.
4. Modeluserinterfaceandmapobjectorientedsystemtorelationalsystem.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandtheconceptsofobjectmodel.(BTL-2)
CO2	Identifytheclasses andvocabularyoftheproblem domain.(BTL-2)
CO3	Illustratetheimportanceofmodellingandsoftwaredevelopmentlifecycle.(BTL-2)
CO4	Drawtheclassandobjectdiagramsforvariousapplications.(BTL-3)
CO5	Applythebasicsofbehaviouralmodellingtobehaviouraldiagrams.(BTL-3)
CO6	Modelthevariouscomponentsanddeploymentdiagramfortheapplications.(BTL-3)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2			1								2	3	
CO2	2			1								2	3	2
CO3	2	2	3	2	2							2	3	2
CO4	2		3		2							2	3	2
CO5	2		3		2							2	3	2
CO6	2		3		2							2	3	

1:Low,2-Medium, 3-High

COURSECONTENT

MODULE –1	Introduction	7HOURS

Introduction: Thestructureofcomplexsystems,theinherentcomplexityof software,attributes of complex system, organized and disorganized complexity, bringing order to chaos,designingcomplexsystems,evolutionofobjectmodel,foundationofobjectmodel,elementsof objectmodel,applyingtheobjectmodel.

AttheendoftheModule1,studentswillbe able to:

1. UnderstandtheGenerationsofProgrammingLanguages.(**BTL-2)**
2. UnderstandtheUnifiedprocess phases. (**BTL-2)**
3. Comparetheobjectorientedprogramming,Designandanalysis. (**BTL-2)**
4. SummarizetheelementsofobjectModel.(**BTL-2)**

MODULE-2	Classesand Objects	8HOURS

ClassesandObjects:TheNatureofanObject,RelationshipsamongObjects,TheNatureofa Class,RelationshipsamongClasses,TheInterplayofClassesandObjects,TheImportanceofProper Classification,Identifying Classesand Objects,KeyAbstractionsand Mechanisms.

AttheendoftheModule2,studentswillbe able to:

1. UnderstandtheNatureofanObject,relationshipsamongobjectsandclasses.**(BTL-2)**
2. Identifytheclasses andobjectstostatemodel.**(BTL-2)**
3. Classifythegeneralapproachestodesignofcomplexsystem.**(BTL-2)**

MODULE-3	IntroductiontoUML	8HOURS

IntroductiontoUML:Whywemodel,ConceptualmodelofUML,Architecture,Classes, Relationships,CommonMechanisms,Classdiagrams,Objectdiagrams

AttheendoftheModule3,studentswillbe able to:

1. Understandtheunifiedmodelinglanguagefor writingsoftwareblueprint.**(BTL-2)**
2. Achievetheaims ofModeltospecifythestructureandbehaviorofsystem.**(BTL-2)**
3. Illustratethevariousartifacttomodelingthedifferentviews ofsystemarchitecture.**(BTL-2)**

MODULE-4	BasicBehavioralModeling	10HOURS

BasicBehavioralModeling: Interactions,Interactiondiagrams,Usecases,Usecasediagrams, ActivityDiagrams.

AttheendoftheModule 4,studentswillbe able to:

1. UnderstandthestructuralModelingcomponents.**(BTL-2)**
2. ComparetheBasicstructuralandadvancedstructuralModelling.**(BTL-2)**
3. Drawtheclassandobjectdiagramforvariousapplications.**(BTL-3)**

MODULE-5	BehavioralModeling	10HOURS

AdvancedBehavioralModeling: EventsandsignalsstatemachinesprocessesandThreads,time andspace,statechartdiagrams**.**

AttheendoftheModule5,studentswillbe able to:

1. UnderstandtheBehavioralModelingcomponents.**(BTL-2)**
2. Applythebehavioralmodelingproperties.**(BTL-2)**
3. DrawtheInteractionandactivitydiagramforvarious applications.**(BTL-3)**

MODULE-6	ArchitecturalModelling	7HOURS

ArchitecturalModelling:Component,Deployment,ComponentdiagramsandDeployment diagrams, TheUnifiedLibraryapplication

AttheendoftheModule6,studentswillbe able to:

1. UnderstandthearchitecturalModelingcomponents.**(BTL-2)**
2. Identifythemechanisms andframeworks thatshapethearchitectureofyoursystem.**(BTL-3)**
3. Drawthe componentanddeploymentdiagramforvariousapplications.**(BTL-3)**

Totalhours:	**50HOURS**

Termwork:

1. DevelopthemodellingofSystemArchitecture:Satellite-BasedNavigation.
2. DevelopthemodellingofArtificialIntelligence:Cryptanalysis.

3. DevelopthemodellingofControlSystem:TrafficManagement.
4. Comparethestaticview,Designview,activityviewandusecaseview.
5. DemonstratethesemanticresponsibitiesandNotationresponsibities.

Contentbeyondsyllabus:

1.Forward &ReverseEngineering ofallUMLdiagrams.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	Elementsofthe ObjectModel	http://www.digimat.in/nptel/courses/video/106105153/L16.html
2	Classesand objects	https://www.youtube.com/watch?v=tWIe9E4SWQo
3	Classdiagram	https://www.youtube.com/watch?v=UI6lqHOVHic
4	Usecasediagram	https://www.lucidchart.com/blog/types-of-UML-diagrams
5	Umlsequence diagram	https://www.lucidchart.com/pages/how-to-draw-a-sequence-diagram-in-UML
6	Activitydiagram	https://www.smartdraw.com/activity-diagram/

TextBook(s):

1. "Object-OrientedAnalysisAndDesignwithApplications",GradyBOOCH,RobertA.Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston,PEARSON,3rdedition,2013.
2. "TheUnifiedModelingLanguageUserGuide",GradyBooch,JamesRumbaugh,IvarJacobson,PEARSON12thImpression,2012.
3. Applying UML and Patterns: An Introduction to object-oriented Analysis and Design anditerative development,byCraigLarman,PearsonEducation.(1998)

ReferenceBook(s):

1. "Object-orientedanalysisanddesignusingUML", MaheshP. Matha, PHI
2. "Headfirst object-orientedanalysisanddesign",BrettD.McLaughlin,GaryPollice,DaveWest,O'Reilly
3. "Object-orientedanalysisanddesignwiththe Unifiedprocess",JohnW.Satzinger,Robert B.Jackson, StephenD.Burd,CengageLearning
4. "TheUnifiedmodelinglanguageReferencemanual",JamesRumbaugh,IvarJacobson,GradyBooch,Addison-Wesley

OnlineResources:

1.https://nptel.ac.in/courses/106/105/106105153/
2.http://www.digimat.in/nptel/courses/video/106105153/L51.html

WebReferences:

1. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_tutorial.pdf
2. https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/
3. https://www.smartdraw.com/uml-diagram/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC215	LINUXPROGRAMMING							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: ACourseon"OperatingSystems"

CourseObjectives:

1. ToExploreUnixOperatingsystem&Explorecommands toworkwithfiles and directories
2. ToknowaboutbasicShellscripting.&SolveAdvancedCandShellScript ProgrammingproblemsinLinuxEnvironment.
3. MemorytodevelopinterProcess communicationinLinux.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Identify the best suitable Process Methodology for developing a quality orientedsoftwaresolution
CO2	Sketchtherequirementsanalysismodelforaprojectworkbyusingvariousmodellingdiagrams
CO3	Applythestandarddesignprinciplesandselectthesuitablearchitecturalstylesforgivenspecifications
CO4	ExplainthestandardGoldenrulesfordevelopingtheuserinterface.
CO5	Applytestingprinciplesonsoftwareproject.
CO6	Identifyandapplyvarioussoftwaremetrics,whichdeterminesthequalitylevelof software

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	3										2	
CO2	2		2							2				
CO3		3		2									2	
CO4	2			2	1							1		
CO5			3											2
CO6	2			2										2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	LinuxUtilities	8Hours

Linux Utilities-File handling utilities,Security by file permissions,Processutilities,Disk utilities,Networking commands, Filters, Text processing utilities and Backup utilities. Sed-Scripts, Operation,Addresses, Commands, Applications, awk- Execution, Fields and Records, Scripts, Operation, Patterns,Actions,AssociativeArrays,StringandMathematicalfunctions,Systemcommandsinawk,Applications.

Atthe endof theModule1,studentswillbeableto:

1. LearnLinuxoperatingsystembasics.
2. Gainthe knowledgeonsecurityandutilites.
3. Learnawk,sedcommands usageinlinux programming.

MODULE-2	Shellprogramming	8Hours

Shell programming with Bourne again shell(bash)- Introduction,shell responsibilities,pipes andRedirection, here documents, running a shell script, the shell as a programming language, shell metacharacters,filenamesubstitution,shellvariables,commandsubstitution,shellcommands,theenvironment ,quoting,testcommand,controlstructures,arithmeticinshell,shellscriptexamples,interrupt processing, functions, debugging shell scripts. Review of C programming concepts-arrays,strings (libraryfunctions),pointers,functionpointers,structures,unions,librariesinC.

Atthe endof theModule2,studentswillbeableto:

1. Explorejavainheritance.
2. Understandtheconcepts ofinterfaces andabstractclasses.
3. Creatingandaccessingapackage.

MODULE-3	Processconcepts&Signals	8Hours

Process – Process concept, Layout of a C program image in main memory, Processenvironment,environmentlist,environmentvariables,getenv,setenv,Kernelsupportforprocess,proce ssidentification, process hierarchy, process states, process control - process creation, replacing a processimage, waiting for a process, process termination, zombie process, orphan process, system call interfacefor process management-fork, vfork, exit, wait, waitpid, exec family, system, I/O redirection, ProcessGroups,SessionsandControllingTerminal,Differencesbetweenthreadsandprocesses.
Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signalfunction,unreliablesignals,reliablesignals,kill,raise,alarm,pause,abort,sleepfunctions.

Atthe endof theModule3,studentswillbeableto:

1. Writetheprogramsforfilemanagement usingI/Ostreams.
2. Illustratetheimportanceofnetworkinginjava.
3. Writetheprogramsonnetworking.

MODULE-4	FilesandDirectories	8Hours

Files and Directories- File Concept, File types, File System Structure, file metadata-Inodes, kernelsupport for files, system calls for file I/O operations- open, create, read, write, close, lseek, dup2,filestatusinformation-statfamily,file andrecordlocking-lockfandfcntlfunctions,file permissions-chmod, fchmod, file ownership-chown, lchown, fchown, links-soft links and hard links – symlink, link,unlink.
Directories-Creating,removingandchangingDirectories-mkdir,rmdir,chdir, obtainingcurrentworkingdirectory-getcwd,Directorycontents,ScanningDirectories-opendir,readdir,closedir, rewinddir,seekdir,telldirfunctions.

Atthe endof theModule4,studentswillbeableto:

1. Handlethepredefined exceptions.
2. Howtocreateandhandletheuserdefinedexceptions.
3. Learntheconcept ofmultithreading.

MODULE-5	Inter-processCommunication&Semaphores	8Hours

Inter-process Communication : Introduction to IPC, IPC between processes on a single computersystem, IPC between processes on different systems, pipes-creation, IPC between related processes usingunnamedpipes,FIFOs-creation,IPCbetweenunrelatedprocessesusingFIFOs(Namedpipes),differencesbetweenunnamedandnamed pipes,popenandpcloselibraryfunctions.
MessageQueues-Kernelsupportformessages,Linux APIsformessages,client/serverexample.
Semaphores-Kernelsupportforsemaphores,LinuxAPIsforsemaphores, filelockingwithsemaphores.

Atthe endof theModule5,studentswillbeableto: 1. Whatistheusageof IPC. 2. Explainthevarious interprocesscommunication. 3. LearnaboutlinuxAPIsfor MessageQueues, Semaphores.		
MODULE-6	**SharedMemory**	8Hours
SharedMemory-Kernelsupportforsharedmemory,APIsforsharedmemory,sharedmemoryexample. Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, **Sockets**:Socketaddressstructures(UnixdomainandInternetdomain),Socketsystemcallsforconnectionorientedprotocolandconnectionlessprotocol,example-client/serverprograms-SingleServer-Client connection,Multiplesimultaneousclients,ComparisonofIPCmechanisms		
Atthe endof theModule6,studentswillbeableto: 1. Learnthedesign ofGraphical UserInterfaceusingswingcontrols. 2. Howtodrawthegraphicalcomponents. 3. Explainaboutvariouslayoutmanagertypes.		
	Totalhours:	**60hours**

Contentbeyondsyllabus:

1.OpensourcesoftwareTestAutomationTools

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	**LinuxUtilities**	CO1	https://infotricks1on1.blogspot.com/p/blog-page_3.html
2	**Shellprogramming withBourneagains hell**	CO2	https://www.tutorialspoint.com/unix/unix-using-variables.htm
3	**Process**	CO3	https://www.tutorialspoint.com/unix/unix-processes.htm
4	**Filesand Directories**	CO4	https://www.geeksforgeeks.org/unix-file-system/
5	**Inter-process Communication**	CO5	https://www.geeksforgeeks.org/inter-process-communication-ipc/
6	**SharedMemory**	CO6	https://www.cse.iitk.ac.in/users/dheeraj/cs425/lec18.html

TextBook(s):.

1. UnixConceptsandApplications, 4thEdition,SumitabhaDas,TMH,2006.
2. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition,rp-2008.
3. UnixNetworkProgramming,W.R.Stevens,PHI.
4. Unix andShellprogramming,B.A.ForouzanandR.F.Gilberg,CengageLearning.

ReferenceBook(s):

1. LinuxSystemProgramming,RobertLove,O"Reilly, SPD,rp-2007.
2. Unixfor programmersandusers, 3rdEdition,GrahamGlass,KingAbles, PearsonEducation,2003
3. UnixshellProgramming,S.G.KochanandP.Wood,3rdedition,PearsonEducation.

OnlineResources:

1. http://www.acadmix.com/eBooks_Download
2. http://www.freetechbook.com/software-engineering-f15.html

WebResources:

1. http://www.nptel.iitm.ac.in/courses/Webcourse-contens/IITKharagpur/SoftEngg/
2. http://www.Computer.org/portal/wen/swebok
3. http://www.softwareengineerinsider.com/articles/what-is-software-engineering.html
4. http://www.tutorialspoint.com/software_engineering

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC216	CRYPTOGRAPHYANDNETWORKSECURITY							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:ComputerNetworks

CourseObjectives:

1. Extensive,thoroughandsignificantunderstandingoftheconcepts,issues,principlesandtheories ofcomputernetworksecurity
2. Identifyingthesuitablepointsforapplyingsecurityfeaturesfornetworktraffic
3. Understandingthevariouscryptographicalgorithmsandimplementationofthesameatsoftwarelevel
4. Understandingthevariousattacks,securitymechanismsandservices
5. TounderstandtheIPsecuritystandards.
6. Tounderstandthewebsecuritystandards.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	AnalyzeProtectingthenetworkfrombothinternaland externalattacks.(BL-4)
CO2	Definenewsecurityapproaches.(BL-1)
CO3	Identifytheappropriatesecurityalgorithmbasedontherequirements.(BL-1)
CO4	AnalyzeIPSecurityandSystemsecuritystandards.(BL-4)
CO5	AnalyzewebSecurity.(BL-4)
CO6	Analyzeintrudersandfirewalls.(BL-4)

CO-POMapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	1							1		2	1
CO2	3	1	2		1								2	1
CO3	2	3	1		2			1					1	2
CO4	3	1	2									1	1	2
CO5	2	3	1								1		2	1
CO6	2	3	1							1		1	2	1

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	Introductiontosecurity	8Hours

SecurityGoals,SecurityAttacks(Interruption,Interception,ModificationandFabrication),SecurityServices (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) andMechanisms, AmodelforInternetworksecurity, InternetStandardsandRFCs.(11hrs)

Atthe endoftheModule1,studentswillbeableto:

1. Understandthesecurityissues.
2. Analyzeinternetstandards.
3. Identifythenetworksecurity.

MODULE-2	Cryptography	8Hours

Conventional Encryption Principles & Algorithms (DES, AES, RC4), Block Cipher Modes of Operation,LocationofEncryptionDevices,KeyDistribution,Publickeycryptographyprinciples,publickeycryptographyalgorithms (RSA,RABIN,ELGAMAL,Diffie-Hellman,ECC),KeyDistribution.(12hrs)

Atthe endoftheModule2,studentswillbeableto: 1. Analyzeencryptionprinciples. 2. Analyzeandapplythecryptographyalgorithms. 3. Understandkeydistribution.		
MODULE-3	**Messageauthentication**	**8Hours**
ApproachesofMessageAuthentication,SecureHashFunctions(SHA-512,WHIRLPOOL)andHMAC(5hrs) DigitalSignatures:Comparison,Process-NeedforKeys,SigningtheDigest,Services,AttacksonDigitalSignatures,Kerberos,X.509DirectoryAuthenticationService.(7hrs)		
Atthe endof theModule3,studentswillbeableto: 1. Identifyandanalyzeapproachesofmessageauthentication. 2. Understanddigitalsignature. 3. Analyzeandapplydigitalsignaturealgorithms.		
MODULE-4	**IPSecurity**	**8Hours**
IPSecurityOverview,IPSecurityArchitecture,AuthenticationHeader,EncapsulatingSecurityPayload,CombingSecurityAssociations,KeyManagement.(9hrs)		
Atthe endoftheModule4,studentswillbeableto: 1. AnalyzetheIP securityarchitecture. 2. IdentifythecombiningSecurityAssociations. 3. Understandkeymanagement.		
MODULE-5	**WebSecurity**	**8Hours**
WebSecurityConsiderations,SecureSocketLayerandTransportLayerSecurity, SecureElectronicTransaction.(8hrs)		
Atthe endof theModule5, studentswillbeableto: 1. AnalyzeWebsecurityconsiderations. 2. Understandsecurityinlayers. 3. UnderstandElectronicTransactions.		
MODULE-6	**Intruders**	**8Hours**
Intruders: Intruders, Intrusion Detection, Password Management, Firewalls: Firewall Design andPrinciples,TrustedSystems.(8hrs)		
Atthe endof theModule6, studentswillbeableto: 1. IdentifyandAnalyzeintrusion. 2. IdentifyPasswordManagement. 3. AnalyzeFirewalls.		
	Totalhours:	**48hours**

Contentbeyondsyllabus: EllipticCurveovertheReals,EllipticcurveModuloaPrime,AuthenticatingfirewallTunnelingframe work.			
Self-Study: Contentstopromoteself-Learning:			
SNO	**Topic**	**CO**	**Reference**

1	Introductiontosecurity	CO1	https://www.geeksforgeeks.org/cryptography-introduction/https://unacademy.com/lesson/cryptography-introduction/TM6KZH4Y
2	Encryptionalgorithms	CO2	http://www.networksorcery.com/enp/data/encryption.https://www.proofpoint.com/us/glossary/encryption
3	Messageauthentication	CO3	https://www.tutorialspoint.com/cryptography/cryptography_digital_signatures.htmhttps://www.geeksforgeeks.org/how-message-authentication-code-works/
4	IPsecurity	CO4	https://www.geeksforgeeks.org/ip-security-ipsec/https://www.tutorialspoint.com/network_security/network_security_layer.htm
5	Websecurity	CO5	http://www.brainkart.com/article/Web-Security-Considerations_8479/https://www.tutorialspoint.com/webservices/web_services_security.htm
6	Intruders	CO6	http://www.brainkart.com/article/Intruders_8369/ https://www.geeksforgeeks.org/intrusion-detection-system-ids/

TextBook(s):

1. NetworkSecurityEssentials(ApplicationsandStandards)byWilliamStallingsPearsonEducation,2008.
2. Cryptography&NetworkSecuritybyBehrouzA.Forouzan,TMH2007.
3. FundamentalsofComputerSecurity,Springer.

ReferenceBook(s):

1. InformationSystemsSecurity,Godbole,WileyStudentEdition.
2. CryptographyandNetworkSecuritybyWilliamStallings,FourthEdition,PearsonEducation2007.
3. NetworkSecurity:Thecompletereference, RobertBragg, MarkRhodes, TMH
4. ComputerSecurityBasicsbyRickLehtinen,DeborahRussell&G.T.GangemiSr.,SPDO'REILLY2006.

OnlineResources/webreferences:

1.https://www.ebooks.com/enus/searchapp/searchresults.net?term=cryptography+and+network+security
2. https://www.freetechbooks.com/cryptography-f107.html3.https://www.e-booksdirectory.com/details.php?ebook=8825.4.https://nptel.ac.in/courses/106/105/106105031/
5.https://www.tutorialspoint.com/cryptography/6.https://www.w3schools.in/cyber-security/modern-encryption/
7.http://www.brainkart.com/crptography/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC217	GRIDCOMPUTING							R20
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

1. ThestudentwilllearnabouttheGridenvironment.
2. UnderstandhowGridcomputinghelps in solving largescalescientificproblems.
3. Gainknowledgeontheconceptofvirtualizationthatisfundamentaltocloudcomputing.
4. Learnhowtoprogramthegridandthecloud.
5. Understandthesecurityissuesinthegridandthecloudenvironment.
6. Understandingtheadvanced gridmiddleware

CourseOutcomes:After successfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandingthefundamentals ofgridcomputing.
CO2	Discussingthebasicsofgridmonitoring.
CO3	Learningtheconceptsof gridsecurityandresourcemanagement.
CO4	Understandingtheconceptsofgridportals
CO5	Understandingtheadvancedgridmiddleware.
CO6	Understandthesecurityissuesinthe gridandthecloudenvironment

CO-POMapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	2		3										1	2
CO2	1	2	2										2	3
CO3	2	1	1		3								1	2
CO4	2	2	2	3									2	1
CO5	2	1	3	2									1	1
CO6	2	2	2	3									2	2

1:Low,2-Medium,3-High

COURSE CONTENT

MODULE–1	**CONCEPTSANDARCHITECTURE**	**8Hours**

CONCEPTSANDARCHITECTURE:Introduction-ParallelandDistributedComputing-ClusterComputing-Grid Computing Anatomy and Physiology of Grid- Web and Grid Services-Grid Standards -OGSA-WSRF-Trends,Challengesandapplications.

AttheendoftheModule1,studentswillbeableto:

1. Analyzethecomponentsofcloudcomputinganditsparallelcomputing
2. EvaluatethevariousChallengesandapplications.
3. IdentifytheuseofSystemmodelsforDistributedandCloudComputing.

MODULE–2	**GRIDMONITORING**	**8Hours**

GridMonitoring:GridMonitoringArchitecture(GMA)-AnOverviewofGridMonitoringSystems-R-GMA-GridICE–MDS-ServiceLevelAgreements(SLAs)-OtherMonitoringSystems-Ganglia, GridMon,HawkeyeandNetworkWeatherService.

AttheendoftheModule2,studentswillbeableto:

1. Discusstheuseofgridmonitoringarchitecture.
2. UnderstandtheuseofServiceLevelAgreement

MODULE–3	**GRIDSECURITYANDRESOURCE MANAGEMENT**	**8Hours**

GridSecurityAndResourceManagement: GridSecurity-ABriefSecurityPrimer-PKI-X509Certificates-Grid Security-Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principlesofLocalSchedulersOverviewofCondor,SGE,PBS,LSF-GridScheduling withQoS.**(10Hrs)**

AttheendoftheModule3,studentswillbeableto: 1.AnalyzethegridResource,gridSecurityandResourceManagement.		
MODULE–4	**DATAMANAGEMENTANDGRIDPORTALS**	**8Hours**
DATAMANAGEMENTANDGRIDPORTALS:DataManagement-CategoriesandOriginsofStructured Data- Data Management Challenges Architectural Approaches-Collective Data ManagementServices-FederationServices-GridPortals-GenerationsofGridPortals.**(10Hrs)**		
Attheendof theModule4,studentswillbeableto: 2. Understandthedatamanagement. 3. Analyzethedatamanagementchallenges. 4. UnderstandtheuseofdatamanagementServices		
MODULE–5	**CLOUDDEPLOYMENTMODELS**	**8Hours**
Clouddeploymentmodels:public,private,hybrid,community–Categoriesofcloudcomputing:Everythingasaservice:Infrastructure,platform,software–ProsandConsofcloudcomputing–Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/Odevices–virtualclustersandResourceManagement–Virtualizationfordatacenterautomation.**(10Hrs)**		
AttheendoftheModule5,studentswillbeableto: 1. ImplementtheLevelsofVirtualizationincloud. 2. UnderstandtheuseofVirtualizationStructures/Toolsandmechanisms. 3. VirtualizetheCPU,MemoryandI/ODeviceusingdatacentres.		
MODULE–6	**GRIDMIDDLEWARE**	**8Hours**
GRID MIDDLEWARE : List of globally available Middlewares - Case Studies-Recent version ofGlobusToolkitandgLite-Architecture,ComponentsandFeatures.FeaturesofNextgenerationgrid. **(10Hrs)**		
AttheendoftheModule6,studentswillbeableto: 1. Tounderstandthefeaturesofgloballyavailablemiddlewares. 2. Analyzethecomponentsandfeaturesofgrid.		
	Totalhours:	**48hours**

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Understanding the fundamentalsofgridc omputing.	CO1	**https://www.youtube.com/watch?v=vkBY07pbgGU**
2	Discussingthebasics ofgrid monitoring	CO2	**https://www.youtube.com/watch?v=QtM3lc3lzO8**
3	Learningtheconcepts ofgridsecurityandresourcem anagement	CO3	**https://www.youtube.com/watch?v=zatxYKB1-dg**
4	Understanding theconceptsof grid portals	CO4	**https://www.youtube.com/watch?v=HyNIyUukcT8**
5	Understandingthe advanced gridmiddlewa re	CO5	https://www.youtube.com/watch?v=DIObHjRhh_U
6	Understand the securityissues in thegrid and thecloud environment	CO6	https://www.youtube.com/watch?v=LcAPj95KeSA

TextBook(s):

1. 1.IanFoster,CarlKesselman,TheGrid2:BlueprintforaNewComputingInfrastructure,ElsevierSeries,2004.
2. 2.VladimirSilva,GridComputingforDevelopers, CharlesRiverMedia, January2006.

ReferenceBook(s):

1. ParvinAsadzadeh,RajkumarBuyya,ChunLingKei,DeepaNayar,andSrikumarVenugopal,GlobalGridsandSoftwareToolkits:AStudyofFourGridMiddlewareTechnologies,HighPerformance Computing: Paradigm and Infrastructure, Laurence Yang and Minyi Guo (editors),WileyPress,NewJersey,USA,June 2005.
2. JarekNabrzyski, Jennifer M. Schopf, Jan Weglarz, Grid Resource Management: State of the Art andFuture Trends , (International Series in Operations Research & Management Science), Springer;Firstedition,2003.
3. SrikumarVenugopal,KrishnaNadiminti,HusseinGibbinsandRajkumarBuyya,
4. DesigningaResourceBrokerforHeterogeneousGrids,Software:PracticeandExperience,WileyPress,NewYork,USA,2008.
5. FranBerman,GeoffreyFox,AnthonyJ.G.Hey,GridComputing:MakingTheGlobalInfrastructureaReality,Wiley,2003
6. MaozhenLi,MarkBaker,TheGrid:CoreTechnologies,Wiley,2005

OnlineResources:

1.hep-proj-grid-tutorials.web.cern.ch/hep...grid-tutorials/.../edg-tutorial.pd..

WebResources:

1. verde.esalq.usp.br/~jorge/cursos/ramiro/Ox_packages/OxMPI/grid.pdf
2. hep-proj-grid-tutorials.web.cern.ch/hep...grid-tutorials/.../edg-tutorial.pd..
3. pages.cpsc.ucalgary.ca/~kiddlec/GridTutorial/WesternGridSummit05.ppt
4. www.collab-ogce.org/ogce/images/d/da/OGCE_TG08Tutorial_Part1.ppt
5. web.eecs.utk.edu/~langston/courses/cs594-fall2003/grid-computing.ppt

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC218	BIGDATAANALYTICS							
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100
Pre-requisite: Basicconcept ofBigData								
CourseObjectives: • IntroductiontoBigData&BigDataChallenges. • Limitations&SolutionsofBigDataArchitecture. • Hadoop&itsFeatures . • HadoopStorage:HDFS(HadoopDistributedFileSystem) • HadoopProcessing: MapReduceFramework. • DifferentHadoopDistributions.								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Toexplorethefundamentalconceptsof BigData.							
CO2	ToLearnBasic concepts ofHadoop.							
CO3	ToWriteHadoopMapReducePrograms foranalyzingBigdata.							
CO4	ToExploreHadoopEcosystem.							
CO5	ManageJobExecutioninHadoopEnvironment.							
CO6	ApplyMachineLearningTechniquesusingR.							

CO-POMapping													
CO	**PO**											**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3		3										2	2
CO2	2	2	3										1	1
CO3	2	1	2	2	2								2	1
CO4	2	2	2	2	1								2	1
CO5	2	2	1	2	2								1	1
CO6	2	2	2	1	1								1	1
1:Low,2-Medium,3-High														

COURSECONTENT		
MODULE–1	**UnderstandingBig Data**	**10Hours**
Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, PredictiveAnalytics,PrescriptiveAnalytics,BigDataCharacteristics– volume,velocity,variety,veracity,value,DifferentTypesofData– StructuredData,UnstructuredData,SemiStructuredData.		
Atthe endoftheModule1,studentswillbeableto: 1. UnderstandingDataAnalytics. 2. LearntoDiagnosticsAnalytics andAnalytics. 3. IdentifybasicsandBigDataCharacteristics.		
MODULE -2	**HadoopBasics**	**8Hours**
Brief history of hadoop, Apache hadoop and the hadoop ecosystem. A weather dataset, analyzingthe datawith unix tools, analyzing the data with hadoop , Understanding different Hadoop modes, understandingHadoop Features-Understanding HDFS, Understanding MapReduce, Learning the HDFS and MapreduceArchitecture-UnderstandingtheHDFSarchitecture,UnderstandingtheMapReduce Architecture.		

Atthe endoftheModule2,studentswillbeableto: 1. Understandthehistoryofhadoop. 2. Developingtheanalyzingthedatawithunixtools. 3. ExplainHDFSandMapreduceArchitecture.		
MODULE-3	**WritingHadoopMapReducePrograms**	**7Hours**
UnderstandingthebasicsofMapReduce,IntroducingHadoopMapReduce-ListingHadoopmapReduce entities,Understanding the Hadoop MapReduce scenario,Understanding the limitationsofMapReduce,WritingaHadoopMapReduceexample-UnderstandingthestepstorunaMapReducejob.		
AttheendoftheModule3,studentswillbeableto: 1. Explainunderstandingthebasicsof MapReduce. 2. BasicoperationsonHadoop MapReduce. 3. UnderstandingthestepstorunaMapReducejob.		
MODULE-4	**LearningDataAnalyticsUnderstandingthedataanalyticsproject lifecycle**	**7Hours**
Identifyingtheproblem,Designingdatarequirement,Pre-processingdata,Performinganalyticsoverdata,Visualizingdata. **Understandingdataanalyticsproblems**-Exploringwebpagescategorization-Identifyingtheproblem,Designing datarequirement,reprocessingdata,Performinganalytics overdata,Visualizingdata.		
Atthe endoftheModule4,studentswillbeableto: 1. UnderstandingDesigningdatarequirement. 2. ExplainPre-processingdata,Performinganalyticsoverdata. 3. ExplainExploringwebpagescategorization.		
MODULE-5	**ProgrammingwithR**	**8Hours**
BasicSyntax,Datatypes,Variables,Operators,DecisionMaking,Loops,Functions,Vectors,lists,Matrices,Arrays,DataFrames,RDataInterfaces–CSVFiles,ExcelFiles,Database,Rcharts& graphs,Rstatistics–Mean,Median,Mode,LinearRegression.		
Atthe endoftheModule5,studentswillbeableto: 1. UnderstandtheBasicSyntax,Datatypes,Variables,Operators. 2. ExplaintheArrays,DataFrames,RDataInterfaces. 3. UnderstandtheCSVFiles,ExcelFiles,Database,Rcharts&graphs.		
MODULE-6	**Frameworks**	**8Hours**
ApplicationsonBigDataUsingPigandHive– DataProcessingoperators inPig–HiveServices –HiveQL–QueryingDatainHive–fundamentalsofHBaseandZookeeper–IBMInfoSphereBigInsightsand Streams.Visualization-Visualdataanalysistechniques,interaction techniques;Systemsand applications.		
Atthe endoftheModule6,studentswillbeableto: 1. TounderstandtheApplicationsonBigData UsingPigandHive. 2. ExplainDataProcessingoperatorsinPig. 3. UnderstandtheVisualdataanalysistechniques,interactiontechniques.		
	Totalhours:	**48hours**

Contentbeyondsyllabus:

1. Advanced topics relatedissuesinBig DataAnalytics.
2. Learningexperiencemeldstheknowledgeof DataAnalyticswith hands-ondemosandprojects.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	UnderstandingBig DataRequirements	CO1	**https://www.redhat.com/en/topics/big-data**
2	HadoopBasics	CO2	**https://www.tutorialspoint.com/hadoop/index.htm**

3	WritingHadoop MapReducePrograms	CO3	**https://hadoop.apache.org/docs/current/hadoop-mapreduce**
4	Understandingdata analyticsproblems	CO4	**https://www.oreilly.com/library/view/big-data-analytics**
5	ProgrammingwithR	CO5	**https://swcarpentry.github.io/r-novice-inflammation/**
6	Fundamentalsof HBase	CO6	**https://www.tutorialspoint.com/hbase/index.htm**

TextBook(s):

1. "Big Data Fundamentals: Concepts, Drivers & Techniques", 1/e, 2016, Thomas Erl, WajidKhattak, PaulBuhler,PrenticeHall.
2. "BigDataAnalyticswithRandHadoop",1e,2013, VigneshPrajapati, PacktPublishingLtd, UK.

ReferenceBook(s):

1. MichaelBerthold,DavidJ.Hand,"IntelligentDataAnalysis",Springer,2007.
2. JayLiebowitz,"BigDataandBusinessAnalytics" AuerbachPublications,CRCpress(2013).
3. TomPlunkett,MarkHornick,"UsingRtoUnlocktheValueofBigData:BigData
4. Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/OsborneMedia(2013),Oraclepress.

OnlineResources:

1. https://www.analyticsvidhya.com/resources-big-data/

WebReferences:

1. www.jigsawacademy.com
2. www.allindiaexams.in
3. www.upgrad.com
4. www.datamation.com

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC219	SOFTWAREPROJECTMANAGEMENT							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100
Pre-requisite:Nil								
CourseObjectives: 1. Tounderstandthesoftwaremanagementandsoftwareeconomics. 2. Tounderstandhowtoimprovethesoftwareeconomicsanditsprinciples.3.Tounderstandthelifecyclephasesof projectdevelopmentanditsartefacts. 4.To understand the process work flow , checkpoints and project organization responsibilities.5.Tounderstandtheprocessmetricsandprocessinstrumentation. 6.Tounderstandtheprocessdiscriminationandfuturesoftwaremanagement.								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Analyzetheconceptofsoftware managementeconomics.(BL-4)							
CO2	Determinehowtoimprovesoftwareeconomics.(BL-3)							
CO3	Analyzelifecyclephasesinprojectdevelopmentandartifactsets.(BL-4)							
CO4	Definethe workflowofthe processandprojectorganizationresponsibilities.(BL-1)							
CO5	Explaintheprojectmetricsandprocessinstrumentation.(BL-1)							
CO6	Identifythefuture software managementandprocessdiscrimination.(BL-1**)**							

CO-POMapping													
CO	**PO**											**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	1					2					2	1
CO2	2	3	1		1							1	1	2
CO3	3	2	1										1	2
CO4	3	1	2		1				2				2	1
CO5	1	3	2										1	2
CO6	1	3	2										1	2
1:Low,2-Medium,3-High														

COURSECONTENT		
MODULE– 1	**CONVENTIONALSOFTWAREMANAGEMENTAND SOFTWAREECONOMICS**	**8Hours**
Conventionalsoftwaremanagement: TheWaterfallModel,ConventionalsoftwareManagementPerformance. **EvolutionofSoftwareEconomics:**SoftwareEconomics,PragmaticSoftwareCostEstimation**.**		
AttheendoftheModule1,studentswillbeableto: 1. DescribethestepsinWaterfallModel. 2. Explaintheconventionalprinciplesinsoftwaremanagementperformanceandsoftwaremetricstop10list. 3. Determinethesoftwareeconomicsandcost estimation.		
MODULE-2	**IMPROVINGSOFTWARE ECONOMICS**	**8Hours**
ImprovingSoftwareEconomics:ReducingSoftwareProductSize, ImprovingsoftwareProcesses,ImprovingTeamEffectiveness, ImprovingAutomation, AchievingRequiredQuality, PeerInspections. **TheOldwayandtheNEWway:**PrinciplesofConventionalSoftwareEngineering,Principlesof		

ModernSoftwareManagement, TransitioningtoanIterativeProcess.		
AttheendoftheModule2,studentswillbeableto: 1. Explainthe stepsincludedinimprovingsoftwareeconomics. **2.** Definetheconceptofachievingrequiredqualityforsuccessfulproject**.** 3. Distinguishbetweentheprinciplesofconventionaland modernsoftwaremanagement		
MODULE-3	**LIFECYCLEPHASESANDARTIFACTS**	**8Hours**
LifeCyclePhases:EngineeringandProductionStages,Inception.Elaboration,Construction,TransitionPhases. **ArtifactsoftheProcess**:TheArtifactSets.ManagementArtifacts,Engineering Artifacts,ProgrammaticArtifacts.ModelBasedSoftwareArchitectures:AManagementPerspectiveandTechnicalPerspective.		
AttheendoftheModule3,studentswillbeableto: 1. ExplaintheclassificationofLifecyclephases. 2. IdentifythedifferentArtifactsetsinlifecyclephases. 3. Analyzethemodelbasedsoftware architectures.		
MODULE-4	**WORKFLOWS OFTHEPROCESSANDORGANIZATION RESPONSIBILITIES**	**8Hours**
FlowsoftheProcess:SoftwareProcess Workflows.InterTrans Workflows.Checkpoints oftheProcess:MajorMileStones,MinorMilestones,PeriodicStatusAssessments.InteractiveProcessPlanning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. InteractionPlanningProcess,PragmaticPlanning. **ProjectOrganizationsandResponsibilities:** Line-of-BusinessOrganizations,ProjectOrganizations, andEvolutionofOrganizations.ProcessAutomation:AutomationBuildingBlocks,theProjectEnvironment.		
AttheendoftheModule4,studentswillbeableto: 1. Determinethe processworkflowinprojectdevelopmentandplanningguidelines. 2. ExplainProjectOrganizationResponsibilitiesandActivities. 3. IdentifytheBuildingblocksinprocessAutomation.		
MODULE-5	**PROJECTCONTROLANDPROCESSINSTRUMENTATION**	**8Hours**
ProjectControlandProcessInstrumention: SevenCoreMetrics,ManagementIndicators,QualityIndicators, LifeCycleExpectationsPragmaticSoftwareMetrics,MetricsAutomation.		
AttheendoftheModule5,studentswillbeableto: 1. ExplainSevencoreMetrics. 2. DistinguishbetweenMangementIndicatorsand QualityIndicators. 3. AnalyzethePragmaticSoftwareMetrics.		
MODULE-6	**TAILORINGTHEPROCESS**	**8Hours**
TAILORINGTHEPROCESS: Processdiscriminates,FutureSoftwareManagement:ModernProjectProfiles Nextgenerationsoftwareeconomics,modernprocesstransitions.		
AttheendoftheModule6,studentswillbeableto: 1. Analyzethetopicofprocessdiscrimination. 2. DescribeModernprojectprofilesand softwareeconomicsnextgenerations. 3. Analysethemoderntransitionprocess.		
	Totalhours:	**48hours**

Self-Study:

Contentstopromoteself-Learning:

S NO	Topic	CO	Reference
1	WaterfallModel	CO1	https://www.google.com/search?q=waterfall+model+in+spm&rlz=1C1CHBD_enIN855IN855&oq=waterfall+model+in+spm&aqs=chrome..69i57j0l2.13538j0j15&sourceid=chrome&ie=UTF-8
2	Improving SoftwareEconomics	CO2	https://www.slideshare.net/deepkumar814/improving-software-economics
3	LifeCyclePhases	CO3	https://www.geeksforgeeks.org/life-cycle-phases-of-project-management/
4	Workflowsof theProcessandProjectOrganization Responsibilities	CO4	https://www.geeksforgeeks.org/process-workflows-in-software-project-management/ https://www.geeksforgeeks.org/project-organizations-and-their-responsibilities/
5	ProcessControland Instrumentation	CO5	http://www.pvpsiddhartha.ac.in/dep_it/lecture%20notes/SPM/unit5.pdf
6	Tailoringtheprocess andFutureSoftwareproject Management	CO6	http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.203.4476&rep=rep1&type=pdf https://project-management-software.financesonline.com/future-project-management/

TextBook(s):

1. WalkerRayce,"SoftwareProjectManagement",1998,PEA.
2. Henrey,"SoftwareProjectManagement",Pearson.
3. Software ProjectManagement, WalkerRoyce:PearsonEducation,2005.
4. AgileProjectManagement,JimHighsmith,Pearsoneducation,2004

ReferenceBook(s):

1. SoftwareProjectManagement,BobHughesandMikeCotterell:TataMcGrawHillEdition.
2. SoftwareProjectManagement,JoelHenry,PearsonEducation.
3. SoftwareProjectManagement inpractice,PankajJalote,PearsonEducation.2005.

OnlineResources:

1. https://www.tutorialspoint.com/software_engineering/software_project_management.html
2. https://www.slideshare.net/sheetal_singh/software-project-management-by-walker-royce

WebReferences:

1. https://docs.google.com/presentation/d/1hYtTO5nJ1yTlOXPWPZTTGtCbYqPEM-bB5GVnxYjuoe0/htmlpresent
2. https://www.slideshare.net/sheetal_singh/software-project-management-by-walker-royce
3. http://archive.mu.ac.in/myweb_test/MCA%20study%20material/M.C.A%20(Sem%20-%20IV)%20Paper%20-%20Software%20Project%20Management.pdf
4. https://london.ac.uk/sites/default/files/study-guides/software-engineering-project-management.pdf

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC301	COMPUTERNETWORKS							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	4	0	0	48	4	40	60	100

Pre-requisite:Acourseon"DataCommunication andNetworkingdevices"

CourseObjectives:

1. Tounderstandtheprinciplesandconceptsoncomputernetworks& datacommunication.
2. Studytheconceptsofcomputernetworksfromlayeredperspective.
3. Tounderstandroutingalgorithmsandinternetprotocols.
4. Tohaveknowledgeindifferentapplications that usecomputernetworks
5. Toexposestudents toemergingtechnologiesandtheirpotential impact

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Explainthebasicconceptsof networks andreferencemodels
CO2	Choosethetransmission mediadependingontherequirements
CO3	Explaindifferentmediaaccesscontroltechniques
CO4	Applytheroutingalgorithms andinternetprotocols
CO5	Developsocket programmingwithTCPandUDP
CO6	Applyvariousapplicationlayerprotocols

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2			1									
CO2	2	1	1	1	1								2	
CO3	1	2	1	3										
CO4	2	2	2	3	1								1	2
CO5	1	3	2		2								1	2
CO6	2	2	1	3	2								2	2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	DataCommunications&Networking	10hr

OverviewofDataCommunications&Networking:

DataCommunications,Networks,NetworksTypes,InternetHistory,Standards&Administrations

NetworkModels: ProtocolLayering,TheOSIReferenceModel,TCP/IPreferenceModel,Comparisonsbetween OSI &TCP,ARPANET

Atthe endof theModule1,studentswillbeableto:

1. Discussthedifferenttypesofnetworks.
2. Discusstheinternetstandards&itsadministrations.
3. Identifysuitablenetworkmodeltobeused.

MODULE-2	PhysicalLayer	09hr

Introduction:DataandSignals,Transmissionimpairment,Dataratelimits,Performance

Transmissionmedia:Introduction,GuidedMedia,UnguidedMedia,Switching:Introduction,CircuitSwitched Networks,Packetswitching.

Atthe endof theModule2,studentswillbe ableto: 1. Analyzetheperformanceofnetwork. 2. Examinethetypeoftransmission mediatobeused. 3. Analyzethetypeof switchingtobeused.		
MODULE-3	**DataLinkLayer**	**10hr**
The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes,Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC,PointtoPointProtocol **Media Access control:** Random Access, Controlled Access, Channelization, Connecting devices andvirtualLANs:ConnectingDevices.		
Atthe endof theModule3,studentswillbeableto: 1. Identifythebasicdesignissuesindatalinklayer 2. Illustratedifferenterrordetectionandcorrectiontechniques. 3. Analyzethemediaaccesscontrol.		
MODULE-4	**NetworkLayer**	**10hr**
TheNetworkLayer:Networklayerdesignissues,Routingalgorithms,Congestioncontrolalgorithms,Qualityof service **Internetworking:**ThenetworklayerintheInternet,IPV4Addresses,IPV6,InternetControlprotocol,OSPF,BGP ,IP,ICMPv4,IGMP.		
Atthe endof theModule4,studentswillbeableto: 1. Discussdifferenttypesofroutingalgorithms 2. Discussdifferent typesofCongestioncontrolalgorithms 3. Identifydifferenttypesofinternetprotocols		
MODULE-5	**TransportLayer**	**09hr**
TheTransportLayer:TheTransport Service, ElementsofTransportProtocols,CongestionControl **Theinternettransportprotocols:**UDP,TCP,Performanceproblemsincomputernetworks,Networkperforman cemeasurement.		
Atthe endof theModule5,studentswillbeableto: 1. Illustratethestrategiesin Transportservices 2. Explainthevarioustransportlayer protocols 3. Analyzetheperformanceproblems&measurement innetworks		
MODULE-6	**ApplicationLayer &Security**	**12hr**
TheApplicationLayer:Introduction,ClientServerProgramming,WWWandHTTP,FTP, e-mail,TELNET,SecureShell,DomainNameSystem,SNMP. **SECURITY:**Introduction– SubstitutionandTranspositionCipher– SymmetricKeyandAsymmetricKeyCryptography–AES,DES,RSA,SHA,TypesofAttacksSecurityServices-Firewalland itstypes		
Atthe endof theModule6,studentswillbeableto: 1. Tounderstandclientserverprogrammingmechanism. 2. Tounderstand differentprotocols usedinapplicationlayer. 3. Tounderstandthesecurityalgorithms. 4. Explainthevarious serviceonsecurity.		
	Totalhours:	**60hours**

Termwork:

1) Configurecomputernetworkslogically.
2) Assignment onMACaddressed&IPaddresses configuration.

3)Identifytheprotocolsusedincommunications

Contentbeyondsyllabus:

1.Networksecuritybasicmechanisms.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	Referencemodels	https://www.javatpoint.com/computer-network-models
2	PhysicalLayer	https://nptel.ac.in/courses/106/105/106105183/
3	DataLinkLayer	https://www.javatpoint.com/data-link-layer
4	NetworkLayer	https://www.javatpoint.com/network-layer
5	Transportlayer	https://nptel.ac.in/courses/106/105/106105183/
6	ApplicationLayer &Security	https://nptel.ac.in/courses/106/105/106105183/ https://www.javatpoint.com/computer-network-security

TextBook(s):

1. "Datacommunicationsandnetworking",BehrouzA.Forouzan,McGrawHillEducation,5th edition, 2012.
2. "ComputerNetworks",AndrewS.Tanenbaum,Wetherall,Pearson,5thedition,2010.

ReferenceBook(s):

1. DataCommunicationandNetworks,BhushanTrivedi,Oxford
2. "InternetworkingwithTCP/IP–Principles,protocols,andarchitecture-Volume1,DouglasE.Comer,5th edition,PHI
3. "ComputerNetworks",5E,Peterson,Davie,Elsevier.
4. "IntroductiontoComputerNetworksandCyberSecurity",Chawan-HwaWu,Irwin,CRCPublications.

OnlineResources:

1.https://nptel.ac.in/courses/106/106/106106091/
2. https://www.coursera.org/specializations/computer-communications
3. https://www.udemy.com/course/computer-networks-for-beginners-it-networking-fundamentals/

WebReferences:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm2.
2. https://www.geeksforgeeks.org/computer-network-tutorials/
3. https://www.guru99.com/types-of-computer-network.html

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC302	DESIGN&ANALYSISOFALGORITHMS							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:CProgramming&Datastructures

CourseObjectives:

- Toknowthe importanceofthespaceandtimecomplexityofagivenalgorithm.
- Tostudyvariousalgorithmdesigntechniquesandimplementation.
- Toutilizedatastructuresand/oralgorithmicdesigntechniquesinsolvingnewproblems.
- UnderstandofLowerBoundtheoryandimplementationtechniquesofit
- Toknowandunderstandbasic computabilityconceptsandthe complexityclassesP,NP,andNP-Complete.
- Tostudysometechniques forsolvingNP-Hardproblems.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Analyzethecomplexitiesofalgorithms anddesignofalgorithms**(BL-4)**
CO2	UsetechniquesDivideandConquer,Greedy, Dynamic Programming,Backtracking,BranchandBoundtosolvetheproblems.**(BL-3)**
CO3	Analyzecriteria andspecificationstonewproblems,andchoosetheappropriatealgorithmicdesigntechniquetosolvethesolution.**(BL-4)**
CO4	Understand how the worst-case time complexity of an algorithm is defined, howasymptoticnotationisusedtoprovidearoughclassificationofalgorithms.**(BL-2)**
CO5	UnderstandandimplementationofLowerBoundtheory**(BL-2)**
CO6	AbletoidentifythatacertainproblemisNP-CompleteorNPHard**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		3											
CO2	2	1	2											2
CO3	1	3	1	1										
CO4	3	3	2		1									
CO5	1		2		1									
CO6	2	1	1	3								1		

1:Low,2-Medium,3-High

COURSECONTENT		
MODULE–1	**Introduction& DivideandConquer**	**8HOURS**

Introduction:WhatisanAlgorithm,Algorithmspecification,Performanceanalysis,Typesofalgorithmstrategies, AsymptoticNotations, PerformanceMeasurement,PerformanceAnalysis, AmortizedAnalysis

DivideandConquer: Divideand conquerBasicMethodStrategy,BinarySearch,Findingthemaximumand minimum,Mergesort,QuickSort,Selectionsort,Strassen'smatrixmultiplication

Atthe endoftheModule1,studentswillbeableto:

1. Learnaboutdifferenttypesofalgorithmsforproblems**(BL-2)**
2. AbletoidentifythePerformanceanalysisofanalgorithm**(BL-2)**
3. ImplementationofDivideandConquerStrategy**(BL-3)**

MODULE-2	GreedyMethodandDynamicProgramming	7HOURS

GreedyMethod: Generalmethod,Knapsack problem,JobSchedulingwith Deadlines,MinimumcostSpanningTrees,Optimalstorageontapes,Single-sourceshortestpaths.
Dynamicprogramming: GeneralMethod,Multistagegraphs,All-pairsshortestpaths,Optimalbinarysearchtrees,0/1Knapsack,Thetravellingsalespersonproblem

Atthe endoftheModule2,studentswillbeableto:

1. Importanceofgreedyalgorithmwhereitisimplemented**(BL-2)**
2. Dynamicprogrammingroleinalgorithms evolution**(BL-3)**
3. DifferentproblemsonGreedyapproachandDynamicProgramming**(BL-2)**

MODULE-3	Basic Traversal & SearchTechniques,BackTracking	10 HOURS

BasicTraversalandSearchTechniques:Techniquesforbinarytrees,TechniquesforGraphs,Connectedcomponentsand Spanningtrees,Bi-connectedcomponentsandDFS

Backtracking: GeneralMethod,8–queensproblem,Sumofsubsetsproblem,GraphcoloringandHamiltoniancycles,KnapsackProblem

Atthe endoftheModule3,studentswillbeableto:

1. AnalysisofGraphsandimplementationofgraphs**(BL-4)**
2. ImplementationofBackTrackingApproach**(BL-3)**
3. AnalyzingofcomplexAlgorithms**(BL-4)**

MODULE-4	BranchandBound	8HOURS

BranchandBound: Themethod,Travellingsalesperson,0/1Knapsackproblem,EfficiencyConsiderations,LIFOBranchandBoundSolution,FIFOBranchandBoundSolution,LCSearchBranchandBoundSolution

Atthe endoftheModule4,studentswillbeableto:

1. ImplementationofBranchandBoundStrategyonProblems**(BL-3)**
2. DifferenttypesofBranchandBoundApproach**(BL-2)**
3. Implementationondifferentproblems**(BL-3)**

MODULE-5	LowerBoundTheory	7HOURS

Lower Bound Theory: Comparison trees, Oracle and adversary Arguments, Lowerbounds throughreductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitiveclosure.IntroductiontoDeterministicandNon-DeterministicAlgorithms		
Atthe endof theModule5,studentswillbeableto: **1.** IdeaabouttheLowerBoundTheory**(BL-3)** **2.** ImplementationandTypesofBranchandBound**(BL-3)** **3.** IdentificationofDeterministicandNon-DeterministicProblems**(BL-3)**		
MODULE-6	**NPHardandNPComplete**	**8HOURS**
NP–Hard andNP–Complete Problems:NP Hardness, NP Completeness, ConsequencesofbeinginP,Cook'sTheorem,ConvexHullAlgorithm,CliqueDecisionProblem,VertexCoverProblem ,ReductionSourceProblems,Reductions:Reductionsforsomeknownproblems		
Atthe endoftheModule6,studentswillbeableto: **1.** DifferencebetweenP,NP,NP-Hard,NP-Complete**(BL-2)** **2.** Reductionanditsimportanceinsolvingproblems**(BL-2)** **3.** DifferentdomainswhereNP-Hardisimplemented**(BL-2)**		
	Totalhours:	**48hours**

TermWork:

1. **PerformanceAnalysis&PerformanceMeasurement:**

The time complexity of a program is the amount of CPU time it needs to run to completion.Performance analysis estimates space and time complexity in advance, while Performance measurementmeasuresthespaceandtimetakeninactualruns.
PerformanceMeasurementmethodsisthetermworkwhichhelptodifferentiatethePerformanceAnalysisandPerformanceMeasurement

2. **AmortizedAnalysis:**

Amortizedanalysisisa methodfor analyzinga givenalgorithm'scomplexity,or howmuchofaresource,especiallytimeormemory,ittakestoexecute.
Amortizedanalysis isbetterapproachfor performanceanalysis!Justifyitthroughsomealgorithms

3. **KnapsackProblem:**

DevelopandalgorithmforFractional and0/1knapsackproblembyusingGreedymethodanddynamicProgrammingApproach

Implementtheknapsackproblemanddevelop aC++/Javaprogramandverifyitthrough someinputsandanalyzethe outputs.
ProblemStatement:

xweight	:	W=10(units)
Totalitems	:	N=4
Valuesofitems	:	v[]= {10,40,30,50}
Weightofitems	:	w[]={5,4,6,3}

4. CooksTheorem:

IdentifydifferentproblemsanddeterminewhetheritisdeterministicornondeterministicwiththehelpofCook'sTheorem

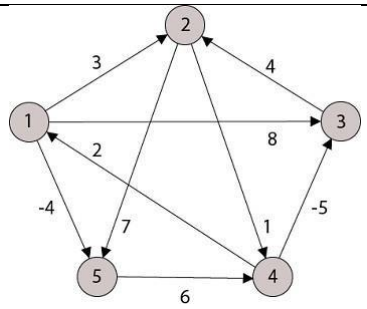
The statements ***verifiable*** *in polynomial time by a* ***deterministic*** *Turing machine* and ***solvable*** *inpolynomialtimeby a****non-deterministic****Turingmachine* aretotallyequivalent.

"AnyNPproblemcanbeconvertedtoSATinpolynomialtime"Provethestatementistrue

5. Floyd-WarshallAlgorithm:

Thistermworkwillhelp tohowtosolveAll-Pairs-Shortes–PathProblemwiththehelpofAlgorithm.

ApplyFloyd-Warshallalgorithmforconstructingtheshortestpath.Showthatmatrices D(k)andπ(k)computedbytheFloyd-Warshallalgorithmforthe givengraph.



Contentbeyondsyllabus:

1.ApproximationandDifferenttypesofApproximation2. Satisfiability

3.ConjunctiveNormalForm

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	**Divide andConquer**	https://www.tutorialspoint.com/data_structures_algorithms/divide_and_conquer.htm
2	**Greedyalgorithms**	https://www.tutorialspoint.com/data_structures_algorithms/divide_and_conquer.htm
3	**0/1 knapsackProblem**	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_01_knapsack.htm
4	**Travelling Salesman problem**	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_travelling_salesman_problem.htm
5	**NPHardand NPComplete**	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_np_hard_complete_classes.htm
6	**CooksTheorem**	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_cooks_theorem.htm

TextBook(s):

1. FundamentalsofComputer Algorithms",EllisHorowitz,S.SatrajSahaniandRajasekhran,2ndedition,UniversityPress.2014,
2. "DesignandAnalysisofAlgorithms",ParagHimanshu Dave,HimanshuBhalchandraDave,PearsonEducation,SecondEdition,2009.

ReferenceBook(s):

1. IntroductiontoAlgorithms",secondedition,T.H.Cormen,C.E.Leiserson,R.L.RivestandC.Stein,PHI Pvt.Ltd./PearsonEducation.
2. "IntroductiontoDesignandAnalysisofAlgorithmsAstrategicapproach", R.C.T.Lee,S.S.Tseng,R.C.ChangandT.Tsai,McGrawHill.
3. "Data structures and Algorithm Analysis in C++", Allen Weiss, Second edition, Pearsoneducation.
4. "DesignandAnalysisofalgorithms",Aho,UllmanandHopcroft,Pearsoneducation.
5. "Algorithms" – RichardJohnsonbaughandMarcusSchaefer,PearsonEducation

Online/WebResources:

1. https://www.pdfdrive.com/horowitz-and-sahani-fundamentals-of-computer-algorithms-2nd-edition- d18723362.html
2. https://www.worldcat.org/title/design-and-analysis-of-algorithms/oclc/754014154/https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3. https://www.javatpoint.com/daa-tutorial
4. https://www.vidyarthiplus.com/vp/Thread-CS6402-Design-and-Analysis-of-Algorithms--38558

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC303	WEBTECHNOLOGIES							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:ACourseon"ObjectOrientedProgrammingthroughJAVA".

CourseObjectives:

1. Understandtheprocesstodevelopdynamicwebpagesusing HTML,CSS, andFormvalidationandeffectivecreationofXMLdocuments.
2. Understandtheconceptsofwebserver andservlets.
3. Understand theconceptsofJSP.
4. UnderstandtheworkingmechanismofJDBC.
5. TointroducePHPlanguageforserversidescripting.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandfundamentalsofobject-orientedprogramminginJava,including defininglasses,invokingmethods,usingclasslibraries,etc.
CO2	ExploreJavaInheritance,Interfacesandtocreateandusepackages
CO3	UnderstandtheroleofI/OStreamsandhowtoestablishthecommunicationthroughnetwo rkinginjava.
CO4	ApplyExceptionHandlingmechanismsandMultithreadingforapplicationdevelopment.
CO5	DesignanddevelopcomplexuserinterfaceapplicationsusingAWT, Applets&Swings
CO6	WorkwithGUI,Eventhandlingmechanism.

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1												2
CO2	2	2	1										1	1
CO3	3	1	2	2	1								2	
CO4	2	2	2	1									2	1
CO5	1	2	2										1	2
CO6	2	1	1										2	

1:Low,2-Medium, 3-High

COURSECONTENT

MODULE –1

HTML:HTMLanditsFlavours,HTMLbasics,Elements,AttributesandTags,BasicTags,AdvancedT ags,Frames,Images,Lists,Tables,Forms.

Cascading style sheets: Advantages, Adding CSS, Browser compatibility, CSS and page layout,Selectors.

At theendofthe Module1,studentswillbeableto:

1. Understandobjectorientedprogrammingconcepts,andapplytheminsolvingproblems.
2. Gaintheknowledgeonobjectorientedprogrammingconcepts.
3. Createclassesandobjects.

MODULE-2

BasicsofJavaScript:overviewofJavaScript,objectorientationandJavaScript,generalsyntactic characteristics, primitives, operations, expressions, screen output and keyboard input,control statements, objectcreation andmodification,arrays,functions,constructors,patternmatchingusingregularexpressions**()** **Java Script:** JavaScriptexecution environment, document objectmodel,elementaccessinJavaScript, events and eventhandling, handlingevents from body elements, handling eventsfrombuttonelements,Handlingeventsfromtextboxandpasswordelements.**()**
At theendofthe Module2,studentswillbeableto: 1. Learn the principles of inheritance andpolymorphism;anddemonstrate how they relatetothedesignofabstractclasses 2. Understandtheconceptsofinterfacesandabstractclasses. 3. Creatingandaccessinga package.
MODULE-3
ExtendedMarkupLanguage: IntroductiontoDynamicHTML–IntroductiontoXML– Documenttype definition – XML Schemas -DocumentObjectModel – Presenting XML – XMLprocessors**()** **Web Server and Servlets:** Introduction to Servlets, features of Java Servlets, Exploring theServlet API, Servlet Life Cycle, Configuring Servlet in web.xml, Working with ServletConfigandServletContextObjects,CreatingaSimpleServlet,theHttpServletRequestandHttp ServletResponse Interfaces,SessionTracking**(h)**
At theendofthe Module3,studentswillbeableto: 1. Writetheprogramsforfile managementusingI/Ostreams. 2. Illustratetheimportanceofnetworkinginjava. 3. Writetheprogramsonnetworking.
MODULE-4
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives,Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies andsessionforsessiontracking,connectingtodatabaseinJSP.**(h)** **JSPApplicationDevelopment:**GeneratingDynamicContent,UsingScriptingElementsImplicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set anAttribute,DeclaringVariablesandMethodsErrorHandlingandDebuggingSharingDataBetween JSP pages, Requests, and Department of Computer Applications Users Passing ControlandDatebetweenPages–SharingSessionandApplicationData– MemoryUsageConsiderations.**(h)**
At theendofthe Module4,studentswillbeableto: 1. Handlethepredefinedexceptions. 2. Howtocreateandhandletheuserdefinedexceptions. 3. Learntheconcept ofmultithreading.
MODULE-5

Java Beans: Introduction to Java Beans, Advantages of Java Bans, BDK Introspection, UsingBound properties, Bean Info Interface, Constrained properties, Persistence, Customizes, JavaBeansAPI **DatabaseAccess:**DatabaseProgrammingusingJDBC,StudyingJavax.sql.*package,Accessing a Databasefroma JSP Page,Application–Specific DatabaseActions.
At theendofthe Module5,studentswillbeableto: 1. Illustratetheusageofapplets. 2. Explainthe variouseventhandlingmechanisms. 3. Writetheprogramsoneventhandling.
MODULE-6
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions,control structures, functions, Reading data from web form controls like text boxes, radio buttons,and lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executingsimple queries,handlingresults,Handlingsessionsandcookies **FileHandlinginPHP:**Fileoperations likeopening,closing,reading,writing,appending, deletingetc.ontextandbinaryfiles,listingdirectories.
At theendofthe Module6,studentswillbe ableto: 1. LearnthedesignofGraphicalUser Interfaceusingswingcontrols. 2. Howtodrawthe graphicalcomponents. 3. Explainaboutvariouslayoutmanagertypes.
Totalhours: 60hours

Termwork: Developjavaapplicationsforappletsand swings.
Contentbeyondsyllabus: **1.**Innerclasses, AccessingdatabaseswithJDBC
Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	JavaBasics	CO1	https://www.javatpoint.com/java-tutorial
2	Inheritance, Interfaces& Packages	CO2	https://www.tutorialspoint.com/java/java_inheritance.htmhttps://www.tutorialspoint.com/java/java_interfaces.htmhttps://www.tutorialspoint.com/java/java_packages.htm
3	I/OStreams& Networking	CO3	https://www.tutorialspoint.com/java/java_files_io.htmhttps://www.tutorialspoint.com/java/java_networking.htm
4	Exception Handling &Multithreading	CO4	https://www.tutorialspoint.com/java/java_exceptions.htmhttps://www.tutorialspoint.com/java/java_multithreading.htm
5	Applets&	CO5	https://www.tutorialspoint.com/java/java_applet_basics.htm https://www.tutorialspoint.com/awt/awt_event_handling.htm

	EventHandling		
6	GUI Programming	CO6	https://www.javatpoint.com/java-awt

TextBook(s):

1. HerbertSchildt,"TheCompleteReferenceJava",TataMcGraw-Hill,10thEdition,2017..
2. Dr. R.NageswaraRao,"CoreJavaAnIntegratedApproach",DreamtechPress.

ReferenceBook(s):

1. ObjectOrientedProgrammingwithJava,B.EswaraReddy,T.V.SureshKumar,P.Raghavan,Pearson-Sanguine
2. T.Budd"UnderstandingObject-OrientedProgrammingwithJava",updatededition,PearsonEducation.
3. CayS. Horstmann, "CoreJavaVolume–1Fundamentals", PearsonEducation.
4. Sagayaraj,Dennis,KarthikandGajalakshmi,"JavaProgrammingforcoreandadvancedlearners" UniversityPress
5. Y.DanielLiang,"IntroductiontoJavaprogramming",PearsonEducation.
6. P.RadhaKrishna,"Object OrientedProgrammingthroughJava",UniversityPress.
7. S.Malhotra,S.Chudhary,"ProgramminginJava",2ndedition,OxfordUniv.Press.
8. R.A.Johnson,"JavaProgrammingandObject-orientedApplicationDevelopment",Cengage Learning.

OnlineResources:

1.https://www.academia.edu/40222417/Java_The_Complete_Reference_Eleventh_Edition_by_Herbert_Schildt

WebResources:

1.https://nptel.ac.in/courses/106/105/106105191/
2. https://www.javatpoint.com/java-tutorial
3. https://www.w3schools.com/java/
4. https://www.tutorialspoint.com/java/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC304	COMPUTERNETWORKSLAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	2	36	1.5	40	60	100

Pre-requisite:Nil

CourseObjectives:

1. ToUnderstandthefunctionalitiesofvariouslayersofOSImodel
2. Toexpose networkingconceptsusingsimpleprograms
3. Toemulateclientserverarchitectureusingdifferentprotocols
4. Toillustratedifferentroutingprotocolsandalgorithmsforreliabledatatransfer.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudent willbeableto:

CO1	Definebasicconceptsofnetworking**(BL-3)**
CO2	Applyerrordetectioncontroltechniques**(BL-3)**
CO3	Applypacketroutingtechniques**(BL-3)**
CO4	DevelopClientServerprogramming**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	3											
CO2	2		2							2				
CO3		3		2										
CO4	1	1			1								1	

1:Low,2-Medium,3-High

COURSECONTENT

TASK– 1 **CO1**

1. Toidentifyvariousdevicesavailablein campus.
2. Toknowtheinternetfacilityavailableincollege

TASK-2 **CO2**

1. WriteaCprogramtoimplement thealgorithmforparitymethodforerrorcontrol.
2. Write a C program to implement the algorithm on hamming method for error correction (both singleand blockerrors).
3. Writea Cprogramto implement the algorithmforchecksumcomputation

TASK-3 **CO3**

1. WriteaCprogramtoimplement thedatalinklayer framingmethodssuchasbitstuffing.
2. WriteaCprogramtoimplement thedatalinklayer framingmethodsuchascharacterstuffing.
3. Writea Cprogramtoimplementdatalinklayerframingmethod character count.

TASK-4 **CO4**

1.WriteaCprogramtoimplementonadata setcharacters thethreeCRCpolynomials– CRC 12,CRC16, and CRCCCIP.

TASK-5 **CO3**

1.WriteaCprogramto Implement Dijkstra'sAlgorithmtocomputetheshortestpaththroughagivenpath

TASK-6 **CO4**

1.Writea Cprogramtotake anexamplesubnetgraphwith weightsindicatingdelaybetween nodes.Nowobtain Routingtablearteach node usingdistancevectorroutingalgorithm.

TASK – 7 **CO3**

1.Writea C programto implementthelinkstateroutingalgorithm

TASK – 8 **CO4**

1.Writea CprogramImplementBroadcastTreefora givensubnethosts

TASK – 9 **CO3**

1.WriteaprogramforFileTransferinclient-server architectureusingTCP/IP

TASK– 10 **CO3**

1.AClientServer applicationforchat.

Totalhours:	**36hours**

TextBook(s):

1. "Datacommunicationsandnetworking",BehrouzA.Forouzan,McGrawHillEducation,5th edition,2012.
2. "ComputerNetworks",AndrewS.Tanenbaum,Wetherall,Pearson,5th edition,2010.

ReferenceBook(s):

1. DataCommunicationandNetworks, BhushanTrivedi, Oxford
2. "InternetworkingwithTCP/IP–Principles,protocols,andarchitecture-Volume1,DouglasE.Comer, 5th edition, PHI
3. "ComputerNetworks",5E,Peterson,Davie,Elsevier.
4. "IntroductiontoComputerNetworksandCyberSecurity",Chawan-HwaWu,Irwin,CRCPublications.

Online/WebResources:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm2.
2. https://www.geeksforgeeks.org/computer-network-tutorials/

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC305	DESIGNANDANALYSISOFALGORITHMSLAB							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	2	36	1.5	40	60	100
Pre-requisite:Nil								
CourseObjectives: 1. Introducesthenotationsfor analysisoftheperformanceofalgorithms. 2. Describesmajoralgorithmictechniques(divide-and-conquer,backtracking,dynamicprogramming,greedy,branchandboundmethods).								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Learnhowtoanalyzeaproblemanddesignthesolutionfortheproblem.							
CO2	Implementefficientalgorithmsfor aspecifiedapplication.							
CO3	Identifyandapplythesuitablealgorithmforthegivenrealworldproblem.							

CO-POMapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	3	3											3
CO2	2		2										2	2
CO3		3		2										
CO4	1	1			1								1	
1:Low,2-Medium,3-High														

COURSECONTENT	
TASK1:GOODDESIGNOFPROGRAM	**CO1**
ImplementLinearsearchandcalculatethetimetakenbythecodeforthefollowingcases: a. Without breakintheloop. b. Withbreakintheloop.	
OBJECTIVE: ToidentifythesignificanceofagoodDesignofaprogram.	
TASK:2 DIVIDE ANDCONQUER-Searching	**CO1**
Usedivideandconquermethodto 1. implementBinarySearch(calculatethetime) a. WithoutRecursiveApproach b. RecursiveApproach	
OBJECTIVE: Toapplydivideandconquerforsearchingproblem	
TASK:3 DIVIDE ANDCONQUER-QuickSort	**CO2**
ToimplementQuickSortofgivenlistofn elements.	
OBJECTIVE: Toapplydivideandconquerforsortingproblems.	
TASK:4DIVIDEAND CONQUER-Mergesort	**CO2**
Toimplement Mergesort foratwosetsofgivenlist ofsizen1,n2elements	
OBJECTIVE: Toapplydivideandconquerforsortingproblems.	
TASK:5GREEDYMETHOD(KnapsackProblem)	**CO2**

FindoptimalsolutionforaKnapsackProblemhavingweightandprofits Wi,Piofelements XnforFractionalKnapsack.
OBJECTIVE: ToapplyGreedyMethod ControlAbstractiontoKnapsackproblems.
TASK-6GREEDYMETHOD(Kruskal's) **CO3**
FindMinimumCostSpanningTreeofagivenundirected graphusingKruskal's algorithm
OBJECTIVE: ToapplyGreedyMethodControlAbstractiontoSpanningTree
TASK-7GREEDYMETHOD(PrimesPrim's) **CO3**
FindMinimumCostSpanningTreeofagivenundirected graphusingPrimes Prim'salgorithm
OBJECTIVE: ToapplyGreedyMethodControlAbstractiontoSpanningTree
TASK -8GREEDYMETHOD(ShortestPath) **CO4**
FindShortestPathofagivenundirected graphusingDijkstra'sAlgorithm
OBJECTIVE: ToapplyGreedyMethodControlAbstractiontoShortestpathproblem.
TASK-9DYNAMICPROGRAMMING(Knapsack) **CO4**
Implement 0/1 Knapsackproblemusingdynamicprogramming.
OBJECTIVE: ToapplydynamicprogrammingMethodto0/1 Knapsackproblem
TASK-10TRAVERSALSTRATEGY **CO5**
Printallthenodesreachablefromagivenstartingnodeinagivendigraphusing a. BreadthFirstSearchmethod. b. DepthFirstSearchmethod.
OBJECTIVE: ToapplyTravsalstrategy
TASK-11BACKTRACKINGSTRATEGY-Sumofsubset **CO6**
Objective:ToapplyBacktrackingmethodtoSumofsubsetproblem. 1.FindasubsetofagivensetS={s1,s2,..... ,sn} ofnpositiveintegerswhosesumisequaltoagiven positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are twosolutions{1,2,6}and{1,8}.Asuitablemessageistobedisplayedifthegivenprobleminstancedoesn'thave asolution.
OBJECTIVE: ToapplyBacktrackingmethodtoSumofsubsetproblem
TASK-12BACKTRACKINGSTRATEGY-NQueen'sproblem **CO6**
Implement4Queen'sproblemusingBackTracking.

OBJECTIVE:
ToapplyBacktracking methodtoNQueen's problem.

AdditionalExperiments

TASK- 13DIVIDEANDCONQUER-SORTING **CO1**

FindingtheKth-smallestelementinagivenlistnelements.

OBJECTIVE:
ToapplydivideandconquerforKthSmallest problems

TASK- 14DIVIDEAND CONQUER- Min-Max **CO2**

Tofindthemaximumand minimuminagiven listofnelements

OBJECTIVE:
ToapplydivideandconquerforMin-Max problems

TASK -15DYNAMICPROGRAMMING(AllPairShortest) **CO3**

Implement AllPairShortest pathsproblemusingFloyd'salgorithm

OBJECTIVE:
ToapplydynamicprogrammingMethodtoAllpair-shortestpathproblem.

Totalhours:	**36hours**

TextBook(s):

1. Fundamentals of Computer Algorithms‖, Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2ndedition,UniversityPress.2014,
2. DesignandAnalysis ofAlgorithms‖,ParagHimanshu Dave,HimanshuBhalchandraDave,PearsonEducation,SecondEdition,2009.

ReferenceBook(s):

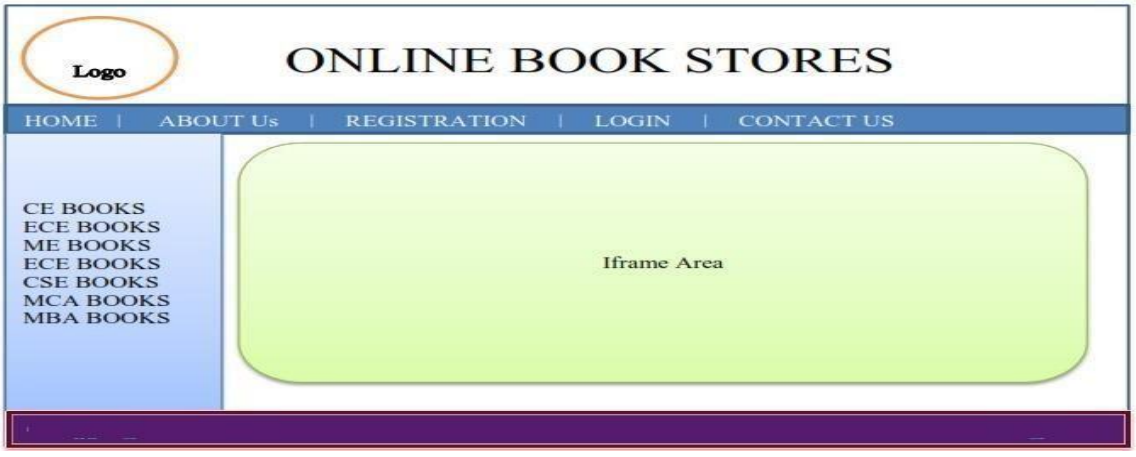
1. IntroductiontoAlgorithms‖,secondedition,T.H.Cormen,C.E.Leiserson,
2. IntroductiontoDesignandAnalysisofAlgorithmsAstrategicapproach‖,R.C.T.Lee, S.S.Tseng,R.C.ChangandT.Tsai,Mc GrawHill.
3. R.L.RivestandC.Stein, PHIPvt.Ltd./PearsonEducation.
4. Algorithms,byDasgupta,PapadimitrouandVazirani, McGraw-HillEducation,2006.
5. AlgorithmDesign,byKleinbergandTardos,Pearson,2005.
6. AlgorithmDesign,byGoodrichandTamassia,Wiley,2001.

WebReferences:

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
2. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3. http://www.facweb.iitkgp.ernet.in/~sourav/daa.html

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC306	**WebTechnologiesLAB**							R20
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	0	0	4	36	2	40	60	100
Pre-requisite: JavaProgrammingLanguage								
CourseObjectives: 1. Togainknowledgeoncreatingthestaticwebpages 2. Topreparestudentsforcreatingthedynamicandresponsivewebpages 3. Topreparestudentsforcreatingtheserversidewebpagesusingdatabase								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Buildawebpageontheirownand usingvalidations							
CO2	ApplybasicresponsiveprogramsusingAngularJs							
CO3	Applythe conceptsfor writingtheprogramsusingXML							
CO4	Buildtheserver sideapplicationswithdatabaseconnectivityusing forms							

CO-POMapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1	2									1	2	2
CO2	1	1	1									2	1	1
CO3	1	1	1									1	2	2
CO4	2	2	2									2	2	2
1-Low,2-Medium,3-High														

COURSECONTENT	**CO**
Task1-HTMLandCSS	
 1. Createthefollowingweb 1. Welcome.html Itexplainabout website (Hint:Headingthewebsite(PreferableH1,Describewebsite) itincludesminimumtwoparagraphs)	CO1

<table>
<tr><td>2. Aboutus.html
(Hint:Aboutownerofwebsite)
3. Contactus.html
(Hint:Incontactus.htmlweb-pageaddGooglemaps)
4. List.html
(Hint:MentionListofcourses)</td><td></td></tr>
<tr><td>Task-2-HTMLandCSSextension</td><td></td></tr>
<tr><td>2.a.Createwebpagesforeachcourse.Examplecse.html(Hint:It containsHeadingandListofsubjectsintabularform)
Example
<table><tr><th>SNo</th><th>Title Book</th><th>Author</th><th>Publisher</th><th>Price</th><th>Image</th></tr><tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td></tr></table>
b.CreateRegistrationandLoginforms
RegistrationForm:ItcontainsStudentName,RollNumber,Password,Gender,EmailID,PhoneNumber,optedcourseandlanguagesknown.
LoginForm:Itcontainsrollnumber,name,userid,password,submitbuttonand cancelbutton</td><td>CO1</td></tr>
<tr><td>Task-3-CSS3</td><td></td></tr>
<tr><td>3.a.ApplyCSS 3 onweb-pages createdon1and2 experiments.
b.Makeuseoftheselectorslikeclass,id,htmlelements,pseudoclassesandelements</td><td>CO1</td></tr>
<tr><td>TASK-4–HTML5andCSS3</td><td></td></tr>
<tr><td>4. DesignHTML5 webpagebyembeddingAudio,Video elements.
5. WriteHTML5andCSS3codetodrawArc,Circle,RectangleandTriangleusingCanvas.</td><td>CO1</td></tr>
<tr><td>TASK-5-Javascript</td><td></td></tr>
<tr><td>6. Writeajavascriptprogramtocreatecalculator
7. WriteaJavaScriptprogramtofindtheareaofatrianglewherelengthsofthethreeofits sides anddisplaytheoutputs inpopupwindows</td><td>CO1</td></tr>
<tr><td>TASK-6-JavascriptandXML</td><td></td></tr>
<tr><td>8. Apply validation and pattern matching on Registration and Login forms on 2(b)experiment
9. WriteanXMLfile which willdisplaytheBookinformationwhich includesthefollowing:
1) Titleofthe book
2) AuthorName
3) ISBNnumber
4) Publishername
5) Edition
6) Price
WriteaDocumentTypeDefinition(DTD)tovalidatetheaboveXMLfile.</td><td>CO3</td></tr>
<tr><td>TASK-7-XMLExtension</td><td></td></tr>
<tr><td>10. CreateaXMLschematodescribeabankthathasoneormorecustomers,accountsoremployee
1. Eachcustomerhasacustomerid,nameandaddress
2. Eachaccounthasanaccountid,branchid,customerid,accounttype,balance</td><td>CO3</td></tr>
</table>

3.Eachemployeehasaempid,name,designation,doj, salaryandaddress 11.CreatetheXMLfilethatcontainsthe informationaboutfivestudentsand displayingthe XMLfile usingXSLT.	
TASK-8-PHP	
12. WritePHP programoncontact uspage 13. Assumefourusersuser1,user2,user3anduser4havingthepasswords pwd1,pwd2,pwd3and pwd4respectively.WriteaPHPfordoingthefollowing 1. CreateaCookieandaddthesefour userid'sandpasswordstothisCookie. 2. Readtheuserid andpasswordsenteredinthe Loginformandauthenticatewiththevalues(userid andpasswords)availableinthecookies. If he is a valid user(i.e., user-name and password match) you should welcome himbyname(user-name)elseyoushoulddisplay"Youarenotanauthenticated user''.	CO4
TASK-9-PHPExtension	
14. Createadatabaseandwritea PHPprogramforregisteringusersofawebsiteandlogin 15. Createatablewhichshouldcontainatleastthefollowingfields:name,password,email-id,phonenumber(theseshouldhold thedatafromtheregistrationform). WriteaPHPprogramtoconnecttothatdatabaseandextractdatafromthetablesanddisplaythem.Experimentwithvarious SQLqueries.Insertthedetails oftheuserswhoregister with the web site, whenever a new user clicks the submit button in theregistrationpage	CO4
TASK-10PHP	
16. Insert the details of the 3 or 4 users who register with the web site by usingregistrationform.Authenticatetheuserwhenhesubmitsthe loginformusingtheuser nameandpassword)fromthedatabase	CO4
TASK-11JavaBean	
17.Writeaprogramin JavaBeanstoaddaButtonto the Beananddisplaythenumber of timesthebuttonhasbeenclicked.	CO2
TASK-12-Servlets	
18. Writeaprogramto receivetwo numbersfromaHTMLform and displaytheirsuminthebrowserbyusing HttpServlet. 19. Writeaprogramto storetheuserinformationintoCookies. Writeanotherprogramtodisplaytheabovestoredinformation byretrievingfromCookies.	CO4
TASK-13-JSPandStructs	
20. WriteajspprogramforStudent RegistrationandLoginFormusingdatabaseconnectivity. 21. WriteaStructsprogramtoprintthehelloworldprogram 22. Writeastructsprogramtocreateaproductformtoperformvalidations	CO4

AdditionalExperiments:	
TASK-14	
23. Writeastructs2programtocreatesamplechatapplication 24. Writeaphpprogramtocreatesampleonlinequizapplication	CO4

TEXTBOOKS:

1. KogentLearningsolutionsInc.,"HTML5Blackbook",Dreamtech,2011,
2. UttamKRoy,"Web Technologies",Oxford,2010
3. ShyamSeshadri&BradGreen,AngularJS:UPandRunning,publishedbyO'ReillyMedia,Inc.,2015

REFERENCEBOOKS:

1. RobertWSebesta,"ProgrammingtheWorldWideWeb",7ed,Pearson,2012
2. PaulSWang,Sanda SKatila,"AnIntroductiontoWebDesign,Programming",Cengage,2003.

OnlineResources:

1. https://www.udemy.com/topic/angularjs/
2. https://www.coursera.org/courses?query=angularjs
3. https://www.coursera.org/learn/web-applications-php?
4. https://www.udemy.com/topic/php/

WebReferences:

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/html/index.htm
3. https://www.javatpoint.com/html-tutorial

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC309	CYBERSECURITY							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:ComputerNetworks

CourseObjectives:

- Appraisethecurrentstructureofcybersecurityroles acrosstheDoD (Department ofDefense)enterprise,includingtherolesandresponsibilitiesoftherelevantorganizations.
- Evaluatethetrendsandpatternsthatwilldeterminethefuturestateofcybersecurity.
- Tocreateanassuranceframeworkfordesignofsecuritypolicies.
- Tostrengthentheregulatoryframeworkfor ensuringasecurecyberspaceecosystem
- UnderstandofCyberLawsandhowtoimplementinthebusinessrequirements

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	UnderstandtheCybersecurityandtroubleshootingofCyber Security**(BL-4)**
CO2	DesignofnewsecurityapproachesandSecurityToolsinCyberCrimes**(BL-6)**
CO3	UnderstandingofComputerForensicsandpracticestotheenvironment**(BL-4)**
CO4	AbilitytoimplementComputerforensicstoprotectDevicesfromattacks**(BL-3)**
CO5	AbilityhowtoProtect thenetworkfrombothinternalandexternalattacks**(BL-1)**
CO6	Analyzecyberlawsforbusinessrequirements,research,developandintegratesolutionsforenterpriseI Trequirements**.(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	1												1	
CO2	2	2	2										2	
CO3	2	3											1	
CO4	2	2	2	3									2	2
CO5	1	1	3											2
CO6	1		3	1									1	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	CyberCrime	8HOURS

Cybercrime:MobileandWirelessdevices-Trendmobility-authenticationservicesecurity-Attacks on mobile phones-mobile phone security Implications for organizations,

OrganizationalmeasurementforHandlingmobile-Security policiesandmeasuresinmobilecomputingera.Cases.
AttheendoftheModule1, studentswillbeableto: **1.** ImportanceandNeedofsecurity**(BL-2)** **2.** Organizationalsecurityimportance**(BL-2)** **3.** SecurityforHand-Helddevicesatthetimeofaccessinternet**(BL-2)**

MODULE-2	**Tools and Methods - CyberCrime**	**7HOURS**

Tools and methods - Cyber Crime-Proxy servers and Anonymizers- Phishing Password cracking- Key loggersand Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacksonwirelessnetwork.Cases.
Attheendof theModule2,studentswillbeableto: **4.** DifferentmethodsofcrackingData**(BL-4)** **5.** Awarenessofdifferenttypesofattacks**(BL-4)** **6.** Methodstohandledifferentattacks**(BL-2)**

MODULE-3	**ComputerForensics**	**10HOURS**

Understanding ComputerForensics-Historical background of cyber forensic, Forensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7LayermodeltocomputerForensicComputerforensicfromcompliance perspectives. Cases**.**
Attheendof theModule3,studentswillbeableto: **1.** Forensicinnovationtoprotectdata**(BL-4)** **2.** Highendofcomputerforensicforsecurecommunication**(BL-2)** **3.** Networkinterpretationforsecuredprocessinginnetworks**(BL-4)**

MODULE-4	**ForensicsonHandHeldDevices**	**8HOURS**

Forensic of Hand –Held Devices-Understanding cell phone working characteristics Hand-Held devices anddigital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital musicdevices-Techno legalChallengeswithevidencefromhand-heldDevices.
Attheendof theModule4,studentswillbeableto: **1.** ImplementationofForensiconhandhelddevices**(BL-3)** **2.** Differentdevicesusingforensics**(BL-4)** **3.** Legalchallenges toovercomeformattacksusingforensics**(BL-4)**

MODULE-5	**CyberSecurity-Applications**	**7HOURS**

CyberSecurity–Applications-Organizationalimplications-costofcybercrimesandIPRissues Webthreatsfororganizations:theevilsandPerils-SocialmediamarketingSecurityandprivacyImplications- ProtectingpeopleprivacyintheorganizationsForensicbestpracticesfor

organizations.Cases.		
Attheendof theModule5,studentswillbeableto:1.Socialmediaimpact on organizations**(BL - 3)** 2.Protectingthemselvesformsocialmedi**(BL-4)** 3.DifferentApplicationwherecybersecurityrequirementisneeded**(BL-4)**		
MODULE-6	**CyberSecurityLawsandActs**	**8HOURS**
Cyber Security: Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to IndianLawandCybercrimeScenarioinIndia,ConsequencesofNotAddressingtheWeakness inInformationTechnology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance,Information Security Policy Standards,Practices,The informationSecurityBlueprint,Securityeducation,Trainingandawarenessprogram,ContinuingStrategies		
Attheendof theModule6,studentswillbeableto: **1.** Differentzonesofcybercrimes**(BL -4)** **2.** Risksfromcybercrimes**(BL-3)** **3.** AdequateknowledgeaboutCyber Laws**(BL- 2)**		
	Totalhours:	**48hours**

Termwork:

1.RSAAlgorithm:

This term work is about RSA algorithm and its importance in Network Security. It is an effective algorithmHence implement RSA algorithm on the text and analyzes the process and output by considering the Inputvalues for different combinations. Also analyze about the comparison study of different algorithms with RSAalgorithmandJustifyit.

2.MS-Windows-Passwords:

ProtectiontotheFoldersbyprovidingLocks tothefolders withthehelpofpasswords.
Cybersecurityincludes thesystemsecurityalso,soitis necessarytoimplementsecurityforthecomputers alsowiththehelpof thistermwork
This termworkwillguidetoattainpasswords tothecomputersandprotectthem.
To study the steps to protect your personal computer system by creating User Accounts with Passwords andtypesofUserAccountsforsafetyandsecurity

3.RemovingPasswords:

This termworkwillhelps toremovethepasswordsforfolders
Removingofpasswords is animportantactivity whichwillbelearnthroughthis Termwork
Tryanysystemwithallottedpasswords andalsoremovetheminasafemannerStudythesteps toremovePasswordsfromMicrosoftWordistheTermwork

4.FireWalls:

Firewalls are a network access control system that divides a network that we presume it's securefromanetworkthatmaybeunsecure.
ThisTermworkwillhelpstoknowaboutthe necessityandimportanceoffirewallsandtocontroltheingoingandoutgoingtraffic.
WhetherFirewallsprovidesecurityfromexternalattacksandinternalattacksornotjustifyit.

5.DistributedDenialofService:

A proper handling of the external attack measures and internal fraud measures like the DDoS attack measure,websystemsecurityreinforcementsolution,securityoperationmonitoringsolutions,administrativeIDmanagementreinforcementsolutionscouldhelpinhandlingthe technicalapproach.

Contentbeyondsyllabus:

1.DigitalSignatures2
.Kerberos
3.Digitalcertificates

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Cybersecurity&cybercrime	CO1	https://www.tutorialspoint.com/fundamentals_of_science_and_technology/cyber_crime_and_cyber_security.htm
2	ComputerForensics	CO2	https://www.geeksforgeeks.org/information-security-and-computer-forensics/
3	CybersecurityStrategies	CO3	https://www.tutorialspoint.com/information_security_cyber_law/cyber_security_strategies.htm
4	Digitalsignatures	CO4	https://www.tutorialspoint.com/information_security_cyber_law/digital_and_electronic_signatures.htm
5	CyberSecurityPolices	CO6	https://www.tutorialspoint.com/information_security_cyber_law/policies_to_mitigate_cyber_risk.htm

TextBook(s):

1. NetworkSecurityEssentials(ApplicationsandStandards)byWilliamStallingsPearsonEducation,2008.
2. Cryptography&NetworkSecuritybyBehrouzA.Forouzan,TMH2007.
3. CyberSecurity:UnderstandingCyberCrimes,ComputerForensicsandLegalPerspectives,NinaGodboleandSunilBelapure,WileyINDIA
4. IntroductiontoCyberSecurity,Chwan-Hwa(john)Wu,J.DavidIrwin.CRC PressT&FGroup

1. ReferenceBook(s):

1. InformationSystemsSecurity,Godbole,WileyStudentEdition.
2. CryptographyandNetworkSecuritybyWilliamStallings,FourthEdition,PearsonEducation2007.
3. FundamentalsofComputerSecurity,Springer.
4. NetworkSecurity:Thecompletereference,RobertBragg,MarkRhodes,TMH
5. ComputerSecurityBasicsbyRickLehtinen,DeborahRussell&G.T.GangemiSr.,SPDO‘REILLY2006.
6. CyberSecurityEssentials,JamesGraham,RichardHowardandRyanOtson,CRCPress.

Online/WebResources:

1. http://index-of.es/Hack/Network%20Security%20Essentials%204th%20Edition.pdf
2. https://www.academia.edu/31141817/Introduction_to_Computer_Networks_and_Cybersecurity
3. www.tutorialpoint.com4.www.geeksforgeeks.com

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC310	HIGHPERFORMANCECOMPUTING							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
	3	0	0	48	3	40	60	100

Pre-requisite:

1. ComputerOrganization&Architecture
2. OperatingSystemProgramming

CourseObjectives:

1. Understandthe concepts ofModernProcessors.
2. Recognizethevariouskindsofoptimizationtechniquesforserialcode.
3. ApplyparallelprogrammingusingOpenMPandMPI.
4. Improvethesystemperformance.
5. Learnvariousdistributedandparallelcomputingarchitecture.
6. Learndifferentcomputingtechnologies

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	RecalltheconceptsusedinModernProcessorsforincreasingtheperformance.
CO2	IdentifyOptimizationtechniquesforserialcode.
CO3	IllustrateParallelComputingParadigms.
CO4	AnalyzetheperformanceissuesinParallelProgrammingusingMPI.
CO5	SummarizesharedmemoryparallelprogrammingwithOpenMp.
CO6	ConstructefficientMPIprogramming.

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2		2										3	2
CO2	1	2												
CO3	1		3		1								3	2
CO4	3		2										3	2
CO5		2		3	3								3	2
CO6	2		3										2	1

1: Low, 2-Medium, 3-High

COURSECONTENT

MODULE– 1	ModernProcessors	8h

Stored-program computer architecture, General-purpose cache-based microprocessor architecture,Memoryhierarchies,Multi coreprocessors, multithreaded processors, Vectorprocessors.BasicOptimization Techniques for Serial Code: Scalar profiling, Common sense optimizations, Simplemeasures,largeimpact,and theroleofcompilersC++optimizations

At theendof theModule 1,students will be ableto:

1. Visualizethecomputerarchitecture
2. Describedifferentmemoryhierarchies.
3. Identifyandobserveofmultitasking.

MODULE-2	ParallelComputers	8h

Parallel Computers: Taxonomy of parallel computing paradigms, Shared memory Computers,Distributed-Memory computers, Hierarchical (hybrid) systems Networks Basics of Parallelization:Whyparallelize?Parallelism,ParallelscalabilityShared-MemoryParallelProgrammingwithOpen MP:ShortintroductiontoOpenMP.		
At theendof theModule 2,students will be ableto: 1. Identifythehardwareperformancecounters. 2. Understandtheinstructionsets. 3. Interpretandobservedynamicmemorymanagement.		
MODULE-3	**TrendsandTransformations**	**8h**
ThebrewingtrendsandtransformationsintheITlandscape: Introduction,TheEmergingITTrends, The Internet of Things(IOT)/Internet of Everything (IOE), Apache Hadoop for Big Data andAnalytics,BigDataintoBigInsightsandActions,Conclusions. **The high performance Technologies:** Introduction, The Emergence of Big Data Analytics(BDA)Discipline,TheStrategicImplicationsofBigData,TheBigDataAnalyticsChallenges,The high-PerformanceComputing(HPC)ParadigmsforfastandBDA		
At theendof theModule 3,students will be ableto: 1. Distinguishparallelcomputingparadigms. 2. DifferentiateserialperformanceVsStrongscalability 3. ObserveRefinedperformancemodels		
MODULE-4	**HighPerformanceApproaches**	**8h**
The HighPerformanceApproaches throughParallelism,Cluster computing, Grid computing,CloudComputing, Heterogeneous computing, Main Frames for High-performance Computing, SupercomputingforBigData Analytics.		
At theendof theModule 4,students will be ableto: 1.		
MODULE-5	**NetworkInfrastructure**	**8h**
Network infrastructure for High – Performance: Introduction, Network Infrastructure for Highperformance Computing, Limitations of Present-Day Networks, Approaches for the Design of NetworkInfrastructureforHigh-PerformanceBigDataAnalyticsStorageInfrastructureforHigh-PerformanceBig DataAnalytics: Introduction,StorageAreaNetworks,StorageInfrastructureforstoringbigdata.		
At theendof theModule 5,students will be ableto: 1. CompareandclassifytheperformanceissuesinParallel ProgrammingusingMPI. 2. ConstructEfficientOpenMPprogramming.		
MODULE-6	**Real-TimeAnalytics**	**8h**
Real-Time Analytics Using High Performance Computing: Introduction, Technologies That supportReal-timeAnalytics,processinginMemory(PIM),In-Database Analytics, **MOA:** Massive Online Analysis, General Parallel file system (GPFS) High performance computing(HPC)paradigms:Introduction,needofMainframes,Cost-AnImportantFactorHPC,CloudComputingCentralized HPC.		
At theendof theModule 6,students will be ableto: 1. UnderstandtheMPIperformancetools. 2. Understandcommunicationparametersandreducecommunicationoverhead 3. DifferentiateNon-blockingVsAsynchronouscommunication.		
	Totalhours:	**48hours**

Termwork: Casestudy:jacobi algorithmanddensematrixtranspose. CaseStudy:Can slowprocessors computefaster-Loadbalance.

Contentbeyondsyllabus:

1.Advancedconceptsofcommunicationandcomputing

TextBook(s):

1. "Introduction to high performance computing for scientists and engineers", Chapman &Hall/CRCComputationalScience 2010 byGeorgHager, GerhardWellein.
2. Pethuraj, Anupama Raman, DhivyaNagaraj, " High-Performane Big Data Analysis:ComputingSystemsand Approaches",1stEd,2015,Springer.

ReferenceBook(s):

1. "SelectedTopicsInAdvancedComputing"EditedByDr.P.PadmanabhamAndDr.M.B.S rinivas,2005 Pearson Education.
2. Marivesar:'Approachingquantumcomputing',PearsonEducation.
3. RezaurRahman,IntelXeonPhiCoprocessorArchitectureandTools,ApressOpen,2013.
4. J.Joseph&C.Fellenstien:'GridComputing',PearsonEducation.
5. KaiHwangandNareshJotwani,"AdvancedComputerArchitecture",TataMcGrawHill.
6. Wen-Mei W Hwu, David B Kirk, Programming Massively Parallel Processors A Hands-onApproach, MorgannKaufmann, 3e.

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC311	MACHINELEARNING							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:Basicsofalgorithmdesign,ProbabilityandStatistics

CourseObjectives:

1. Tounderstandthebasicprinciplesofmachinelearning.
2. Tounderstandvariousclassificationmethods.
3. Tounderstandtheconceptsofdimensionalityreductionandclustering.
4. Tounderstandthefundamentalsofartificialneuralnetworks.
5. Tounderstanddifferentkernelfunctionsandlearningmodels.
6. TounderstandthefundamentalsofReinforcementlearning.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandthetypesofmachinelearningandits applications.**(BL-2)**
CO2	Analyzevarious classificationmethodstoclassifythetraineddata.**(BL–4)**
CO3	Applyprinciplesofclusteringtoclassifyuntraineddata.**(BL-3)**
CO4	Understandtheroleofneuralnetworksinclassificationofdata.**(BL-2)**
CO5	Identifytheusageofkernelfunctionsandvarious learningtechniques.**(BL-1)**
CO6	Differentiatebetweenlearningtechniques.(BL–4)

CO-POMapping

CO	PO												PSO	
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2											2	2
CO2	1	2	2	1									1	
CO3	3	1	1	2									1	2
CO4	2	2	2	1	1								2	
CO5	3	2	1										1	
CO6	2	2	3	3										2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	INTRODUCTION	8HOURS

Introduction: MachineLearning,Types ofMachineLearning,Examples.
SupervisedLearning:Learningclassfromexamples,VCDimension,PACLearning,Noise,LearningMultipleClasses,regression,ModelSelectionandgeneralization,dimensions ofasupervised learningalgorithm.

Attheendof theModule1,studentswillbeableto:

1. Typesofmachinelearning.**(BL-2)**
2. Examples ofmachinelearninginrealtime.**(BL-2)**
3. Fundamentalsofclassification.**(BL-4)**

MODULE-2	CLASSIFICATION	7HOURS

ParametricMethods:Introduction,MaximumLikelihoodEstimation,EvaluatingEstimator,Bayes'Estimator,Parametric Classification.
MultivariateMethods: Multivariate Data, Parameter Estimation, Estimation of MissingValues,MultivariateNormalDistribution,MultivariateClassification,MultivariateRegression.

Attheendof theModule2,studentswillbeableto:

1. Variousparametricmethodsforclassification..**(BL-4)**
2. Estimatorsforevaluation.**(BL -5)**
3. Multivariateclassification.**(BL-4)**

MODULE-3	Clustering	10HOURS

Introduction: Subset Selection, Principal Component Analysis, Factor Analysis,MultidimensionalScaling,Linear DiscriminantAnalysis.

Clustering: Introduction, Mixture densities, k-means clustering, EM-Algorithm, HierarchicalClustering, Choosingthenumberofclusters.

Non-parametricMethods:Introduction,non-parametricdensityestimation,non-parametricclassification.

Attheendof theModule3,studentswillbeableto:

1. Principlesofdimensionalityreductioninnormalizingthedatasize..**(BL-2)**
2. Variousclusteringapproachesforgroupinguntraineddata.**(BL-4)**
3. various non-parametricmethodsusedinclusteringofdata..**(BL-4)**

MODULE-4	DecisionTrees&ANN	8HOURS

Introduction,UnivariateTrees,Pruning,RuleExtractionfromTrees,LearningRulesfromData MultilayerPerceptron:Introduction,trainingaperceptron,LearningBooleanFunctions,MultilayerPerceptron,Backpropogation Algorithm,trainingProcedures

Atthe endoftheModule4,studentswillbeableto:

1. knowingtheprinciplesofhowtoidentifyclasslabels.**(BL-2)**
2. fundamentalsofartificialneuralnetworks.**(BL-4)**
3. varioustrainingprocedurestotrainthedataset.**(BL-4)**

MODULE-5	KERNELMACHINES&HMM	7HOURS

Introduction,Opticalseparatinghyperplane,v-SVM,Kerneltricks,verticalkernel,definingkernel,multiclasskernelmachines,one-classkernelmachines.

BayesianEstimation:Introduction,estimatingtheparameterofadistribution,Bayesianestimation,GaussianProcesses.

HiddenMarkovModels:Introduction,discreteMarkovprocesses,HMModels,basicproblemsofHMM,evaluation problem, finding the state sequence, learning model parameters, continuous observations, HMM withinputs, modelselectionwithHMM.

AttheendoftheModule5,studentswillbeableto:

1. varioustypes ofkernelfunctionsandtheirrole.**(BL-4)**
2. variousestimationprocessesforfindingaccurateresults.**(BL-4)**
3. Basicproblems ofHMMandevaluationprocesses..**(BL-2)**

MODULE-6	ReinforcementLearning	8HOURS

GraphicalModels:Introduction,canonicalcases forconditionalindependence,d-separation,Beliefpropagation,undirectedgraph,Markovrandomfield

Reinforcement Learning: Introduction, single state cases, elements of reinforcement learning,temporal differencelearning,generalization,partiallyobservedstate.

Atthe endoftheModule6,studentswillbeableto:

1. Theimportanceofgraphicalmodelsinanalyzingthesolutions..**(BL-3)**
2. Theroleof reinforcement learningintrainingthedata. .**(BL-2)**
3. Differentiatebetweenlearningstrategies..**(BL-4)**

Totalhours:	**48hours**

Term work:

1. Machine Learning: When youare about to tag someoneonFacebook,before evenmentioning thenameofthe person in the image,Facebookgivesyoua suggestion and 99.99%it gives the rightname.HowdoesFacebookknowthenameofthepersonyouareabouttotagintheimage?

2. MultivariateRegression:Aresearcherhascollecteddataonthreepsychologicalvariables,fouracademicvariables(standardized testscores),and the typeofeducationalprogram the studentisinfor600highschoolstudents.Sheisinterestedinhowthesetofpsychologicalvariablesisrelatedtotheacademicvariablesandthetypeofprogramthestudentisin.

3. MultidimensionalScaling:VendorEvaluations:Industrialpurchasingagentsmustchooseamongvendorswhodiffer– forexample,in price,delivery, reliability,technical service and credit.Howpurchasing agentssummarize thevariouscharacteristicsto determine aspecificvendorfromwhomtopurchasewouldbeinformationthatwouldhelpvendorsdesignsalesstrategies.

4. Training Procedures: Employee training is one of the most critical parts of the employee experience.When anewemployee starts,they're asponge,ready to absorbinformation about yourcompany,yourpoliciesandprocedures,andtheirroleandresponsibilities.Existingemployeesalsoneedongoing trainingtolearnnewskills,improveexistingonesandcontinuetogrowovertime.Butwhat'sthebestwaytofacilitatethetrainingprocess?

5. ReinforcementLearning:Turnsoutawalkintheparkisnotsosimpleafterall.Infact,itisacomplexprocessdonebycontrollingmultiplemusclesandcoordinatingwhoknowshowmanymotions.Ifcarbon-basedlifeformshavebeendevelopingtheseaspectsofwalkingformillionsof years,canAIrecreateit?

Contentbeyondsyllabus:
1.Inaccessibledataanddatasecurity

Self-Study:
Contentstopromoteself-Learning:

SNO	Topic	Reference
1	Introduction toMachineLearning	https://www.edureka.co/blog/introduction-to-machine-learning/,https://www.geeksforgeeks.org/ml-types-learning-supervised-learning/
2	Methods forclassification	https://medium.com/@jorgesleonel/classification-methods-in-machine-learning-58ce63173db8,https://machinelearningmastery.com/types-of-classification-in-machine-learning/

3	Clustering Techniques	https://www.geeksforgeeks.org/clustering-in-machine-learning/https://www.analyticsvidhya.com/blog/2016/11/an-introduction-to-clustering-and-different-methods-of-clustering/
4	Artificial NeuralNetworks	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htmhttps://www.geeksforgeeks.org/introduction-artificial-neural-network-set-2/
5	Hidden MarkovModels	https://medium.com/@jonathan_hui/machine-learning-hidden-markov-model-hmm-31660d217a61 https://www.geeksforgeeks.org/markov-decision-process/
6	Reinforcement Learning	https://www.geeksforgeeks.org/what-is-reinforcement-learning/https://medium.com/@violante.andre/simple- reinforcement-learning-temporal-difference-learning-e883ea0d65b0

TextBook(s):

1. AConciseIntroductiontoMachineLearning,AnithaC.Faul,CRCPress,2020
2. AnIntroductiontoMachineLearningSpringerInternationalPublishing GopinathRebala,AjayRavi,SanjayChuriwala,2019.
3. ABriefIntroductiontoMachineLearningforEngineersNowPublishersOsvaldoSimeone,2018
4. E.Alpaydin"IntroductiontoMachineLearning",thirdEdition,MIT Press,2014

ReferenceBook(s):

1. AnIntroductiontoMachineLearningSpringerInternationalPublishingMiroslavKubat(auth.),2017
2. AnintroductiontomachinelearningInterpretability,O'Reilly,PatrickHallandNavadeepGill,2018
3. Abriefintroductionto machinelearningforengineers,kingscollegeLondon,OsvaldoSimeone,2018

2.Anintroductiontomachinelearning,Springer,Kubat,Miroslav,2015

OnlineResources:

1. http://web4.cs.ucl.ac.uk/staff/D.Barber/textbook/091117.pdf
2. https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/index.html
3. https://alex.smola.org/drafts/thebook.pdf

https://seat.massey.ac.nz/personal/s.r.marsland/MLBook.html

WebReferences:

1. https://www.guru99.com/machine-learning-tutorial.html
2. https://www.toptal.com/machine-learning/machine-learning-theory-an-introductory-primer

3.https://nptel.ac.in/courses/106/106/106106198/

4.https://www.youtube.com/watch?v=T3PsRW6wZSY

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC312	PHP							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: Basicknowledgeofwebprogramming,HTML,CSS,JavaScript

CourseObjectives:

1. TogainthePHPprogrammingskills.
2. TousetheMVCpatterntoorganizecode,testanddebugaPHPapplication.
3. ToworkwithMySQL andlearnCRUD operations.
4. Tolearnhowto handlePHPerrorswithApacheadmin.
5. Tolearnhowtosuccessfullybuildinteractive,data-drivensites.
6. Toworkwithformdataandvalidatedata.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Tounderstandthebasicsof programminginPHP.(BL-2)
CO2	Towriteanddebugproceduralphpscripts.(BL-3)
CO3	Tounderstandfundamentalrelationaldatabaseconcepts.(BL-2)
CO4	TohandleandlogPHPerrors.(BL-4)
CO5	Todesignarelationaldatabasesuitableforablog.(BL-6)
CO6	Toworkwithinteractiveforms.(BL-5)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3		2	3							1	2		
CO2	2			2				1						
CO3	1			1					1		1		2	
CO4	3		2								1	1		
CO5	2			1							1		2	
CO6	2		2									1	2	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	Introduction	8HOURS

PHP,MYSQL,LAMP: Whattheyareandwhattheydo.StaticVsdynamicpages,ClientsideVs Server-sidescripting,obtainingPHPandMYSQLsoftware,resourcesandtools,XAMPPasadevelopmentenvironment.

AttheendoftheModule1,studentswillbeableto:

1. Learnthedetails aboutPHP,MySQLandLAMP
2. Identifydifferencesbetween clientandserversidescripting
3. ExaminethedevelopmentenvironmentofXAMPP

MODULE-2	BasicsofprogrammingwithPHP	8HOURS

Basics: Variables, constants, data types, operators, expressions, control structures & decision making,functions, type casting, program flow. Documenting your code, Simple templates with PHP, organizingyourapplication,findingandfixingbugsinyourcode.
HTTPclient-servercommunication:HTTPheaders,serverresponsecodes.

AttheendoftheModule2,studentswillbeableto:

1. Learnthebasics ofPHPprogramming
2. Examinetheprogramflowanddocumentthecode
3. IllustrateontheHTTPclientservercommunication

MODULE-3	MYSQL	8HOURS

MYSQL: Relationaldatabasesvs.spreadsheets.MYSQLintheterminal, relationaldatabaseDesign,MYSQL'sdata types.
CRUDoperations:create,read,updateanddeletedata,primary,foreignanduniquekeys.
Gettingresultsfrom more than one table:joins,One-to-one,one-to-many,many-to-manyrelationships,Columnandtablealiases,changingtablestructure,tabletypesandaggregatequeries.

AttheendoftheModule3,studentswillbeableto:

1. LearntheMySQLandthedifferencesbetweendatabases
2. ExaminetheCRUD operationsonthetables
3. Obtainresultsfrommorethanonetable

MODULE-4	Apacheadmin	8HOURS

PHP,MYSQLandApacheadmin:php.ini,my.ini&httpd.conf,dealingwiththelegacysettings,register_globalsandmagic_quotes,howtohandleandlogPHPerrors.		
AttheendoftheModule4,studentswillbeableto: 1. UnderstandtheusageofApacheadmin 2. Createiniandconffiles anddealing withregistersettings 3. HandleandloggingofthePHPerrors		
MODULE-5	**OntheWeb**	**8HOURS**
PHPandMYSQLontheweb:ConnectingtoMYSQLusingPHP.Queryingthe databaseandusing the results, Dynamic templating, Single and multiple article templates. PHP'ssuperglobals,acceptinguserinputthroughthe URLandforms.		
Atthe endoftheModule5,studentswillbeableto: 1. MakeconnectionstoMySQLusingPHP 2. Createdatabasequeriesand dealwithtemplates 3. Dealwithweb byacceptinguserinputs throughURL		
MODULE-6	**Forms**	**8HOURS**
Forms:validationandgivinguserfeedback. Dynamicnavigation. **BuildingasimpleCMS:**DatabaseCRUDoperationsthroughawebfrontend,defensiveprogramming,securityconsiderations,workingasawebdeveloper.		
AttheendoftheModule6,studentswillbeableto: 1. ToprogramtheFormvalidationswithfeedbacks 2. TobuildasimpleCMSforaweb frontend 3. Developprogrammingforawebwithsecurityconsiderations		
	Totalhours:	**48HOURS**

Termwork:

1. **Forms:-CollegeLibrary:**Createaformforacollegelibraryenteringstudentdetailsforeachstudentin the college. Validate the form using PHP validates and display error messages. This term workfocuses on generating a PHP application for library books. This task has to address a good database ofbooks and studentsmaintained. Handle the PHPerrors andlog any PHP errors. Use the apache adminfor thepurpose.
2. **Cookies:-Userid and password validation:**Read theUserid and Passwords entered in the Loginform and authenticate with the values (User_Id and Passwords) available in the cookies. If he is a validuser (i.e., User_Name and Password match) you should welcome him by name (User_Name) else youshoulddisplay"Youarenotanauthenticated user".
3. **Database:**The term work is to carry out a PHP application which does the following job: Insert thedetails of 100 users who register with the web site by using registration form. Authenticate the userwhen he submits the login form using the User_Name and Password from the database (instead ofcookies).
4. **Catalogue:**Create tablesin thedatabase which contain thedetailsof books(Bookname,Price,Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connecttothedatabaseandextractdatafromthetables anddisplaytheminthecataloguepageusingPHP.
5. **CRM: Small CRM project using PHP and MySQL**: As part of this term work, the student has toperform modules say User(User Registration, Profile management, Request a Quote, Ticketing system),Admin(Dynamicdashboard,Manageusers,Managetickets,Managequotes,Uservisitgraph,check useraccesslogs).UseLAMPforthisminiproject.

Contentbeyondsyllabus:

1. FileHandlinginPHP
2. PHPSessions

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	PHPIntroduction	https://www.tutorialspoint.com/php/php_introduction.htm https://www.javatpoint.com/php-tutorial
2	Controlstatements	https://www.javatpoint.com/php-if-else https://www.tutorialspoint.com/php/php_decision_making.htm
3	MySQL	https://www.javatpoint.com/mysql-tutorialhttps://www.tutorialspoint.com/mysql/index.htm

4	Apacheadmin	https://www.tutorialspoint.com/linux_admin/linux_admin_install_apache_web_server_centos_7.htmhttps://www.javatpoint.com/how-to-install-apache-web-server-on-centos
5	Databaseconnect	https://www.javatpoint.com/php-mysql-connect https://www.tutorialspoint.com/php/php_and_mysql.htm
6	Formvalidation	https://www.tutorialspoint.com/php/php_form_introduction.htm https://www.javatpoint.com/php-form

TextBook(s):

1. StevenHolzner,"PHP:theCompleteReference",1stEdition,McGrawHills,PHP5.2,2015.
2. VikramVaswani,"MySQL:ThecompleteReference",1stEdition,McGrawHills,2015.
3. PHPfortheWeb:VisualQuickStartGuideFifthEdition.LarryUllman.PeachpitPress,2016

ReferenceBook(s):

1. TheJoyofPHPProgramming:ABeginner'sGuide–byAlanForbes.
2. PHP&MySQLNovicetoNinja–byKevinYank
3. HeadFirstPHP &MySQL–byLynnBeighley&MichaelMorrison

Online/WebResources:

1. https://www.pdfdrive.com/php-books.html
2. https://www.freetechbooks.com/php-f43.html
3. http://www.freebookcentre.net/Web/Free-Php-Books-Download.html
4. http://www.nptelvideos.com/php/php_video_tutorials.php
5. https://www.javatpoint.com/php-tutorial
6. https://www.youtube.com/watch?v=OK_JCtrrv-c
7. https://www.tutorialspoint.com/php/index.htm

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC313	SOFTWAREARCHITECTURE							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	4	40	60	100

CourseObjectives:

1. Understandsoftwarearchitecturalrequirements.
2. Toanalysethearchitecturestyles.
3. Beexposedtovariousqualityattributes.
4. Toanalysetheachievingarchitecturegoals
5. To analysethearchitectureofcloud environment.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Discusstheimportanceandroleofsoftwarearchitectureinlarge-scalesoftware systems.
CO2	Analysethearchitecturestyles
CO3	Assessthequalityattributesofasystemat thearchitecturallevel.
CO4	Recognizeandusethemajorsoftwarearchitecturemodels.
CO5	Analyzethesoftwarearchitecturequalities,attributesandsolutions.
CO6	Analysethe Architectureofcloudenvironment.

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	1										2
CO2	3	2	2	1									1	2
CO3	2	2	1		1								1	1
CO4	3	2	2	2									2	1
CO5	3	2	1	1									1	2
CO6	3	2	1	1									2	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	ENVISIONINGARCHITECTURE	8Hours

Introduction – What is software Architecture-What is Software Architecture, Other Points ofView, ArchitecturalPatterns, Reference Models, and Reference Architectures, Importance ofSoftwareArchitecture,ArchitecturalStructuresandviews.ArchitectureBusinessCycle-Architectures influences, Software Processes and the Architecture,Business Cycle, Making of"Good" Architecture.

At theendofthe Module1,studentswillbeableto:

1. Understandthesoftwarearchitecturalrequirements
2. Describeinfluenceofsoftwarearchitectureonbusiness.

MODULE-2	DESIGNINGTHEARCHITECTURE WITHSTYLES	8Hours

DesigningtheArchitecture:ArchitectureintheLifeCycle,DesigningtheArchitecture,Formattingthe TeamStructure,CreatingaSkeletalSystem.
ArchitectureStyles:ArchitecturalStyles,PipesandFilters,DataAbstractionandObject-

OrientedOrganization,Event-Based,ImplicitInvocation,LayeredSystems,Repositories,Interpreters.		
At theendofthe Module2,studentswillbeableto: 1. Abilitytounderstandthearchitecturelifecycle. 2. Describetheuseofarchitecturestyles.		
MODULE-3	**CREATINGAN ARCHITECTURE-1**	**8Hours**
CreatinganArchitecture:UnderstandingQualityAttributes–FunctionalityandArchitecture,ArchitectureandQualityAttributes,SystemQualityAttributes,QualityAttribute.ScenariosinPractice,OtherSystemQualityAttributes,BusinessQualities,ArchitectureQualities.AchievingQualities:IntroducingTactics,AvailabilityTactics,ModifiabilityTactics,Performance,Tactics,SecurityTactics,TestabilityTactics,Usability Tactics.		
At theendofthe Module3,studentswillbeableto: 1. Abilitytounderstand,to usethequalityattributes 2. Explainthetactics.		
MODULE-4	**CREATINGANARCHITECTURE-II**	**8Hours**
DocumentingSoftwareArchitectures:UseofArchitecturalDocumentation,Views,ChoosingtheRelevantViews,Documentingaview,DocumentationacrossViews.Reconstructing SoftwareArchitecture:Introduction,InformationExtraction,DatabaseConstruction,ViewFusion,andReconstruction.		
At theendofthe Module4,studentswillbeableto: 1. Abilitytousearchitecturedocumentation. 2. Specifytherelevantviewsinsoftwarearchitecture		
MODULE-5	**ANALYZINGARCHITECTURES**	**7Hours**
The ATAM: Participants in the ATAM, Outputs of The ATAM, Phases Of the ATAM. TheCBAM: Decision-Making Context, The Basis for the CBAM, Implementing the CBAM. TheWorldWideWeb:ACasestudyinInteroperability-RelationshiptotheArchitectureBusiness Cycle,RequirementsandQualities,ArchitectureSolution,AchievingQualityGoals.		
At theendofthe Module5,studentswillbeableto: 1.Abilitytoanalyzethearchitecturequalities, attributesandsolutions.		
MODULE-6	**BRAVE NEWWORLD**	**9Hours**
Architecture in The Cloud: Basic cloud definitions, service Models and Deployment options,EconomicJustification,BaseMechanisms,SampleTechnologies,Architectinginacloudenvironment.Architecture ‘Sfor the Edge: The Ecosystem of Edge-DominantSystems changestothesoftwaredevelopmentlifecycle,ImplicationsforArchitecture,Implicationsofthe MetropolisModel.		
Atthe endof theModule6,studentswillbeableto: 1.Abilitytoanalyzethearchitecture ofcloudenvironment.		
	Totalhours:	**48hours**

TextBook(s):

1.SoftwareArchitectures inPractice, LenBass, PaulClements, RickKazman,2ndEdition,

PearsonPublication.
2.SoftwareArchitecture,MaryShawandDavidGarlan,FirstEdition,PHIPublication,1996

ReferenceBook(s):

1. SoftwareDesign:FromProgrammingtoArchitecture,EricBraude, Wiley, 2004.
2. N.DomainsofConcerninSoftwareArchitecturesandArchitectureDescriptionLanguages.Medvidovic andD.S.Rosenblum.USENIX.

OnlineResources:

1. https://cosmolearning.org/courses/software-architecture-design/video-lectures/

WebResources:

1. https://www.tutorialspoint.com/software_architecture_design/index.htm
2. https://index-of.es/Varios2/Software%20Architecture%20and%20Design%20Tutorial.pdf

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC314	DATASCIENCE							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:DBMS,DataMiningAlgorithms,ProbabilityandStatisticsConcepts

CourseObjectives:

1. Tointroducethefieldofdatascience,the natureandstructure ofdata.
2. Toemphasizetheimportanceandapplicationofmathematicsinanalyzingthedata.
3. Todeveloptheskillsinusingdatasciencetechniquesfor solvingdataintensive problems.
4. Tounderstandlearningconceptsthatisvitalfordatascience.
5. Toanalyzethedifferentiationandinfluenceoflearningstrategiesincomputerscience.
6. Toevaluatedatavisualizationsbasedontheirdesignanduseforcommunicatingresults.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	ExplaintheneedforDatascience,howdataiscollected,managedandstoredforDS**(BL-2)**
CO2	Understanda mathematicalflowprocessfordatascienceproblems**(BL-2)**
CO3	AnalyzeVariousformsof dataanalysisandanalyticstechniques**.(BL-4)**
CO4	Solve dataproblemswhentruthvaluesfortraining areavailable**.(BL-3)**
CO5	Understandthekeyconceptsindatascience,includingtheirreal-worldapplications.**(BL-2)**
CO6	Applyvisualizationtechniquestoportraytheresultseffectively**(BL-3)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	1	2	1			3		1		3	1	
CO2	3	2	1											
CO3	1	3	2	2						2		3		
CO4	3	2	1	2	2					1		3	3	
CO5	3	2	1	1	2					1		3	3	
CO6	3	2	1		2					3				

1:Low,2-Medium,3-High

COURSECONTENT

MODULE– 1	CONCEPTUALINTRODUCTIONS	8HOURS

Introduction: What Is Data Science?, Where Do We See Data Science?, How Does Data Science RelatetoOtherFields?,TheRelationshipbetweenDataScienceandInformationScience,ComputationalThinking, Skills for Data Science, Tools for Data Science, Issues of Ethics, Bias, and Privacy in DataScience
Data: DataTypes,DataCollections,DataPre-processing

AttheendoftheModule1,studentswillbeableto:

1. AbletoknowhowDSaffectsorisconnectedtovariousfields.**(BL -2)**
2. Understandwhatkindsofskillsadatascientist shouldhave..**(BL- 2)**
3. Abletoknowhowtotreatand representdata.**(BL-2)**

MODULE-2	Linear Algebrafor DataScience	7HOURS

AlgebraicView: Introduction,Vectors,Matrices(AllOperationsofMatrices)
GeometricView: Introduction,Vectors,Distances,Projections,Eigenvalues,Eigenvectors

AttheendoftheModule2,studentswillbeableto:

1. AnalyzetheroleofmathematicsinDS.**(BL- 4)**
2. Abletoexplaintheimportanceofvectorstorepresentdata.**(BL- 4)**
3. CompareandcontrastEigenvaluesandvectors. .**(BL-4)**

MODULE-3	Techniques	10HOURS

Techniques–Introduction,DataAnalysisandDataAnalytics,DescriptiveAnalysis,DiagnosticAnalytics, Predictive Analytics, Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis-Regression

AttheendoftheModule3,studentswillbeableto:

1. Identifyanddifferentiate betweendata mining,bigdata.**(BL-2)**
2. Abletounderstanddifferencesbetweenanalysisandanalytics.**(BL- 2)**
3. Analyzevariousanalysistechniquesusedinmanyrealtimedomains.**(BL-4)**

MODULE-4	Supervised Learning - Classification	8HOURS

Introduction : Logistic Regression, Classification with kNN, Decision Tree - Decision Rule,ClassificationRule,AssociationRule,RandomForest, NaïveBayes,Support VectorMachine(SVM)

AttheendoftheModule4,studentswillbeableto:

1. Understandtheclassificationoflearningstrategies.**(BL- 2)**
2. Understandthesignificanceofregressioninfluenceindataanalysis.**(BL- 2)**
3. Evaluatevariousclassificationtechniques.**(BL- 5)**

MODULE-5	Unsupervised Learning - Clustering	7HOURS

Introduction -Agglomerative Clustering, Divisive Clustering, Expectation Maximization (EM),IntroductiontoReinforcementLearning

AttheendoftheModule5,studentswillbeableto:

1. Understandthedifferentiationbetweenclassificationandclustering.**(BL-2)**
2. Compareandcontrastvariousclusteringtechniques.**(BL- 4)**
3. Understandnewlearningstrategyusedinrealtimescenario. .**(BL-2)**

MODULE-6	CommunicatingData	8HOURS

Whydoescommunicationmatter?,Identifyingeffectiveandineffectivevisualizations,whengraphsandstatistics lie.

AttheendoftheModule6,studentswillbeableto:

1. Abletoknowtheimportance of communicatingresultseffectively.**(BL- 4)**
2. Abletoidentifynovelvisualizationtools.**(BL-2)**
3. Abletounderstandtherelationshipbetweendataandstatistics.**(BL- 2)**

Totalhours:	**48hours**

Termwork:

1. **Computational Thinking:**Imagine you have grown to like Tollywood movies recently and startedfollowing some of the well-known actors from the Telugu film industry. Now you want to predictwhich of these actor's movies you shouldwatch when a new one is released. Here is a moviereviewdatasetfromthepastthatmighthelp.Itconsistsofthreeattributes:moviename,leading

actorinthemovie,anditsIMDBrating.[Note:assumethat abetterratingmeansamorewatchablemovie.]

Leadingactor	Moviename	IMDB rating(out of 10)
Prabhas	bahubali	7.0
Prabhas	chatrapathi	6.0
Ntr	Temper	6.0
Ntr	JanathaGarage	7.3

2. **Descriptive Analysis:**Let us test your understanding of histogram and related concepts on thepizza franchise dataset from the Business Opportunity Handbook. The dataset is available from OA3.1, where X represents annual franchise fee in $100 and Y represents the startup cost in the samenumeration. Using this data and your favorite spreadsheet program, plot the data to visualize thestartupcostchangeswiththefranchisecost.
3. **Decision Tree:**Let us test your understanding of a decision tree algorithm with all categoricalvariables.Thedatasetyouare goingtouse isaboutcontactlenses(downloadfromOA9.8),whichhasthreeclasslabels:
    1. Thepatientshouldbeprescribed hardcontactlenses.
    2. Thepatientshouldbeprescribedsoftcontactlenses.
    3. Thepatientshouldnotbefittedwithcontactlenses.

Buildadecisiontree-basedclassifierthat wouldrecommendtheclasslabelbasedontheotherattributesfromthedataset.

4. **DivisiveClustering:**Topracticemoreonclustering,obtaintheUserknowledgemodelingdataset(available from OA 10.2), which contains five numeric predictor attributes, and one categoricaltarget attribute, which is the class label. Use both divisive and agglomerative clustering on thisdataset and compare their accuracy in predicting the class label from the predictor attributes. Howmanyclusters willyoucreate?Why?Explainthevariousdesigndecisionsyoumake.
5. **Identifyingeffectivevisualizations:**Apartfromvisualdemonstrationsofdata,verbalcommunication is just as important when presenting results. Justify and present an explanation ontypesof verbalcommunicationofpresentingresults.

Contentbeyondsyllabus:

1. DimensionalityReductionUsingFeatureExtraction
2. DimensionalityReductionUsingFeatureSelection

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	ToolsforDatascience	https://www.dataquest.io/blog/best-free-tools-data-science/
2	LinearAlgebrafor Data Science	https://nptel.ac.in/courses/106/106/106106179/(Week-2Lec:12To18)
3	DataAnalysisandData Analytics	https://www.simplilearn.com/data-science-vs-big-data-vs-data-analytics-article
4	ClassificationwithkNN	https://www.youtube.com/watch?v=LqBzNsfXoQU
5	Introductionto ReinforcementLearning	https://www.youtube.com/watch?v=2pWv7GOvuf0&list=PLqYmG7hTraZDM-OYHWgPebj2MfCFzFObQ
6	DataVisualization Techniques	https://www.youtube.com/watch?v=NOIfMY0KajE

TextBook(s):

1. AHands-OnIntroductiontoDataScience,CambridgeUniversityPress,ISBN10:1108472443,2020
2. PrinciplesofDataScience-Learnthetechniquesand mathyouneedtostartmakingsenseofyourdata bySinanOzdemir,
3. LinearAlgebraandItsApplications,4thEdition,Gilbert Strang
4. DataScience&BigDataAnalytics: Discovering,Analyzing,VisualizingandPresentingData,EMCEducationServices,WileyPublishers,2015

ReferenceBook(s):

1. JoelGrus,Data SciencefromScratch, Oreillymedia,2015.
2. Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to StatisticalLearningwith ApplicationsinR,February11,2013,weblink: www.statlearning.com.
3. MarkGardener, BeginningRThestatistical ProgrammingLanguage,Wiley, 2015.
4. Han , Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman,2012.

OnlineResources/WebReferences:

1. https://intellipaat.com/blog/tutorial/data-science-tutorial/
2. https://www.guru99.com/data-science-tutorial.html
3. https://www.edureka.co/blog/data-science-tutorial/
4. https://www.programmer-books.com/introducing-data-science-pdf/
5. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119092919
6. https://www.digiteum.com/data-visualization-techniques-tools
7. https://towardsdatascience.com/applications-of-reinforcement-learning-in-real-world-1a94955bcd12
8. https://scikit-learn.org/stable/modules/tree.html
9. https://www.academia.edu/8135057/Methods_of_Data_Analysis

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC315	IOT							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	4	40	60	100
Pre-requisite: RequireDatacommunicationandnetworkingfundamentals								
CourseObjectives: 1. Toapprisestudentswithbasicknowledgeof IoTthatpavesaplatformtounderstand physical,logicaldesignandbusinessmodels 2. To teach a student how to analyze requirements of various communicationmodelsandprotocolsfor cost-effectivedesignofIoTapplicationsondifferentIoTplatforms. 3. Toexplainthestudentshowtocodefor anIoTapplicationand deployforreal-timescenario.								
CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:								
CO1	Describevarious layers ofIoTprotocolstackanddescribeprotocolfunctionalities.							
CO2	Evaluateefficiencytrade-offsamongalternativecommunicationmodelsforanefficientIoTapplicationdesign.							
CO3	ComprehendadvancedIoTapplicationsandtechnologies fromthebasics ofIoT.							
CO4	Understandworkingprinciplesofvarioussensorfordifferent IoT platforms							
CO5	Estimatethecostofhardwareandsoftwareforlowcostdesign IoTapplications. Comparevariousapplicationbusinessmodelsofdifferentdomains							
CO6	Solvereal-timeproblemsanddemonstrateIoTapplicationsinvariousdomainsusing prototypemodels.							

CO-POMapping													
CO	**PO**											**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	3	3											
CO2	2		2							2				
CO3		3		2										
CO4	2			2	1							1		
CO5			3											2
CO6				2										2
1:Low,2-Medium,3-High														

COURSECONTENT		
MODULE–1	**Introduction**	8Hours
IntroductionToInternetof Things: Introduction –Definition & Characteristics of IoT-Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks,Security.		
Atthe endof theModule1,studentswillbeableto: 1. UnderstandtheCharacteristicsofIoT. 2. DiscussthedifferentChallengesandissuesofIoT 3. ExplainthefunctionalblocksofIoT.		
MODULE-2		8Hours

Components In Internet of Things: Control Units Communication modules Bluetooth ZigbeeWifi GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc), MQTT, Wired Communication,PowerSources.

Atthe endof theModule2,studentswillbeableto:

1. Havingaclearunderstandingofthesubject relatedconceptsandofcontemporaryissues
2. DiscussthedifferentIoTProtocols.
3. IllustratetheimportanceofMQTT

MODULE-3	TechnologiesBehind IoT	8Hours

Technologies Behind IoT: Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks,SCADA (Supervisory Control and Data Acquisition), M2M - IOT Enabling Technologies -BigDataAnalytics,Cloud Computing,EmbeddedSystems.,WhyPythonLanguagefor IoT?

Atthe endof theModule3,studentswillbeableto:

1. Understandthefourpillars ofIoT
2. Illustratetheimportanceofwirelesssensornetworks.

MODULE-4	MicrocontrollerForIoT	8Hours

Programming The Microcontroller For IoT: Working principles of sensors IOT deploymentforRaspberryPi/Arduino/EquivalentplatformReadingfromSensors,Communication:C onnecting microcontroller with mobile devices, communication through Bluetooth, wifi andUSB -ContikiOS-CoojaSimulator.

AttheendoftheModule4,studentswillbeableto:

1. Understandtheworkingprinciplesofvarioussensorsfordifferent IoTplatforms.
2. DescribeandexplainRaspberryPi.
3. Identifytheneed ofarduino.

MODULE-5	ResourceManagement&WebOfThings	8Hours

Resource Management in IoT: Clustering, Clustering for Scalability, Clustering Protocols forIOT

From The Internet Of Things To The Web OfThings: The Future Web of Things Setupcloud environmentCloud access from sensors Data Analytics for IOT- Case studies- OpenSourcee-HealthsensorplatformBeClose Elderlymonitoring Otherrecentprojects.

Atthe endof theModule5,studentswillbeableto:

1. Havingdesignthinkingcapability.
2. Havingabilitytodesignacomponentoraproductapplyingalltherelevant standards andwithrealisticconstraints.
3. DiscussthevariousclusteringprotocolsforIoT

MODULE-6	IoTApplications	8Hours

IoTApplications: Businessmodelsfortheinternetofthings,Smartcity,smartmobilityandtransport,sm artbuildingsandinfrastructure,smarthealth,environmentmonitoringand surveillance.RecentTrends.

Atthe endof theModule6,studentswillbeableto:

1. Solvereal-timeproblemsanddemonstrateIoTapplicationsinvariousdomainsusingprototypemodels.

Totalhours:	**48hours**

Termwork:
AcaseStudyonCurrenttrends

Contentbeyondsyllabus:Robotics

Self-Study:
Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	PhysicalDesignofIoT	CO1	https://www.edureka.co/blog/iot-tutorial/
2	MQTT	CO2	https://fiware-tutorials.readthedocs.io/en/latest/iot-over-mqtt/index.html
3	FourpillarsofIOT paradigm	CO3	https://studylib.net/doc/5531248/ch.3-four-pillars-of-iot
4	Working principles ofsensorsIOTdeployment forRaspberryPi	CO4	https://www.pubnub.com/blog/internet-of-things-101-getting-started-w-raspberry-pi/
5	ClusteringProtocolsfor IOT	CO5	https://www.tutorialspoint.com/software_testing/software_testing_overview.htm
6	Businessmodelsfor the internetofthings	CO6	https://www.edureka.co/blog/iot-applications/

TextBook(s):
1. DieterUckelmannet.al,ArchitectingtheInternet ofThings,Springer,2011
2. ArshdeepBahgaandVijayMadisetti, InternetofThingsAHand-onApproach, Universitiespress,2015

ReferenceBook(s):
1. CharalamposDoukas, BuildingInternet ofThingswiththeArduino, Createspace, April2002
2. Dr.OvidiuVermesanandDr.PeterFriess,Internet ofThings:Fromresearchandinnovationtomarketdeployment,RiverPublishers2014.

OnlineResources:
1. https://nptel.ac.in/courses/106105166/
2. https://onlinecourses.nptel.ac.in/noc17_cs22/preview

WebResources:
1. https://www.upf.edu/pra/en/3376/22580.
2. https://www.coursera.org/learn/iot.

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC316	SOFTCOMPUTING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: Basic conceptsof ArtificialIntelligence.Knowledge ofAlgorithms

CourseObjectives:

Thecourseshouldenablethestudentsto:

1. illustratetheimprovedtechniquesandmethodologiesofsoft computingthatdifferfromconventionalartificialintelligence
2. Abletodesignandanalyzeonreallifeproblemsusingvariousneurallearningalgorithms.
3. Conceptualizefuzzylogicanditsimplementationforvariousreal-worldapplications.
4. Studytheadvantages andlimitationsofhybridlearningalgorithms.

CourseOutcomes:Uponsuccessfulcompletionofthiscoursestudentsshouldbeableto:

CO1	Developapplicationondifferentsoftcomputingtechniques
CO2	DevelopapplicationondifferentsoftcomputingtechniquesGA
CO3	DevelopapplicationondifferentsoftcomputingtechniquesusingFuzzylogics,
CO4	DevelopapplicationondifferentsoftcomputingtechniquesinNeuralnetwork
CO5	ImplementNeuro-FuzzyandNeuro-Fuzz-GAexpertsystem.
CO6	Describesthesoft computingApplications

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	3										2	
CO2	2		2				1			2				
CO3		3		2									2	
CO4	2			2	1		2					1		
CO5			3											2
CO6	2			2										2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	SoftComputing	8HOURS

Introduction: What is Soft Computing? Difference between Hard and Soft computing, Requirement ofSoftcomputing,MajorAreasofSoftComputing,ApplicationsofSoftComputing.

Characteristic behavior of intelligent systems, knowledge based systems, knowledge representation andprocessing, soft computing characteristics; Constitutes of soft computing: Fuzzy logic and computing,neuralcomputing,evolutionarycomputing,roughsets,probabilisticreasoningandmachinelearning

AttheendoftheModule1,students willbeableto:

1. Learnsoftcomputing.
2. Gaintheknowledgeonsoft/hardcomputing.
3. Learnapplicationsofsoftcomputing.

MODULE-2	GeneticAlgorithm	8HOURS

Intoduction,HistoryofGeneticAlgorithms(GA),WorkingPrinciple,Various Encodingmethods,Fitness function,GAOperators-Reproduction,Crossover,Mutation,ConvergenceofGA,BitwiseoperationinGA,Multi-levelOptimization.

At the endofthe Module 2,studentswillbe able to:

1. Whatistheusageofgeneticalgorithm
2. Understandthe conceptsofvariousencodingmethods.

MODULE-3	FuzzyLogicAndFuzzySystems	8HOURS

FUZZY LOGIC AND FUZZY SYSTEMS: Evolution of fuzzy logic, fuzzy sets, fuzzy logic operations,fuzzy relations, fuzzy arithmetic and fuzzy measures, fuzzy rules and reasoning. Fuzzy inference systemsmamdanifuzzy model, sugenofuzzy model, tsukamoto fuzzy model, fuzzy modeling and decision making,neuro-fuzzymodeling, inputspacepartitioningandfuzzymodeling.

AttheendoftheModule3,studentswillbeableto:

1. Whatistheuseoffuzzylogicsinrealtime
2. Illustratetheimportancefuzzylogics.
3. Understandtheconceptoflogics.

MODULE-4	NeuralNetworks	8HOURS

WhatisNeuralNetwork,Learningrulesandvariousactivationfunctions,SinglelayerPerceptrons,Back Propagationnetworks,ArchitectureofBackpropagation(BP)Networks,BackpropagationLearning,V ariationofStandardBackpropagationNeuralNetwork,Introduction to Associative Memory,Adaptive Resonance theory and Self Organizing Map,RecentApplications.

AttheendoftheModule4,studentswillbeableto:

1. Howto handleneuralnetworks.
2. Explaintheconceptofback propagationnetworks.
3. Learntheconceptofnetworkapplications.

MODULE-5	HybridSystems	8HOURS

IntoductionofHybridSystems,SequentialHybridSystems,AuxiliaryHybridSystems,EmbeddedHybridSyste ms,Neuro-FuzzyHybridSystems,Neuro-GeneticHybridSystems,Fuzzy-GeneticHybrid Systems

AttheendoftheModule5,studentswillbeableto:

1. WhatistheusageofHybridSystem.
2. ExplainthevariousNeuro-FuzzyhybridSystem.

MODULE-6	ApplicationsOfSoftComputingTechniques	8HOURS

ApplicationsOfSoftComputingTechniques:

Applicationsoffuzzyinpatternrecognition:Printedcharacterrecognition,inversekinematicsproblems,automob ilefuelefficiencyprediction,softcomputingforcolorrecipeprediction,applicationsofevolutionarycomputingin imageprocessingandcomputer vision,softcomputinginmobilead-hocnetworks,softcomputingininformationretrievalandsemanticweb,softcomputinginsoftwareengineering.

AttheendoftheModule6,studentswillbeableto:

1. LearnSoftcomputingapplicationsinmobileandad-hocnetworks.
2. Learninformationretrievalandsemanticweb

Totalhours:	**48hours**

Termwork:

TermworkwillbebasedonPracticalandAssignmentscoveringthetopicsof thesyllabus

Contentbeyondsyllabus:

1. Fuzzymembershipfunction
2. FuzzyExtensionprinciple

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	SoftComputing	CO1	https://wisdomplexus.com/blogs/soft-computing-vs-hard-computing/
2	GeneticAlgorithm	CO2	https://www.tutorialspoint.com/genetic_algorithms/genetic_algorithms_introduction.htm
3	FuzzySystems	CO3	https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_applications.htm
4	NeuralNetworks	CO4	https://www.guru99.com/backpropogation-neural-network.html
5	HybridSystems	CO5	https://www.geeksforgeeks.org/introduction-ann-artificial-neural-networks-set-3-hybrid-systems/
6	ApplicationsOf SoftComputing.	CO6	http://digitalthinkerhelp.com/what-is-soft-computing-and-its-applications-and-techniques/

TextBook(s):.

1. J.S.R.Jang, C.T.Sun and E.Mizutani, ìNeuro-Fuzzy and Soft Computingî, PHI, 2004,PearsonEducation2004.
2. TimothyJ.Ross,ìFuzzyLogicwithEngineeringApplicationsî, McGraw-Hill, 1997.
3. LaureneFausett,—FundamentalsofNeuralNetworks:Architectures,AlgorithmsandApplications‖,PearsonEducation,Inc,1stEdition,2008.

ReferenceBook(s):

1. NeuralNetworks,FuzzyLogicandGeneticAlgorithms:Synthesis &Applications,S.Rajasekaran,
2. G.A.Vijayalakshami,PHI.
3. GeneticAlgorithms:SearchandOptimization,E.Goldberg.
4. Neuro-FuzzySystems,ChinTengLin,C.S.GeorgeLee,PHI.
5. Build_Neural_Network_With_MS_Excel_samplebyJoechoong.

OnlineResources:

1. https://www.books.google.co.in/books?id=bVbj9nhvHd4C
2. https://www.books.google.co.in/books?id=GrZHPgAACAAJ&dq=1.+J.S.R.Jang,+C.T.Sun+and+E.Mizutani,+Neuro,+Fuzzy+and+Soft+Computing,+PHI,+2004,Pearson+Education.
3. http://tradownload.com/.../soft-computing-techniques-by-sn-sivanandam-and-sn-deepa.html

WebResources:

1. http://www.sctie.iitkgp.ernet.in/
2. http://www.rkala.in/softcomputingvideos.php
3. http://www.sharbani.org/home2/soft-computing
4. http://www.myreaders.info/html/soft_computing.html

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC317	NATURALLANGUAGEPROCESSING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

1. Introducetosome oftheproblemsandsolutionsofNLP.
2. Tounderstandsyntaxandsemanticanalysis.
3. TounderstandproblemsandsolutionsofNLPandtheir relationtolinguisticsandstatistics.
4. Introducetomachinetranslation.
5. Tounderstandthestatisticalmachinetranslation.
6. Tounderstandapplicationsastextcategorization.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Expresssensitivitytolinguisticphenomenaandanabilitytomodelthemwithformal grammars.(BL-2)
CO2	Understand proper experimental methodology for training and evaluating empirical NLPsystems.(BL-2)
CO3	Determineprobabilities andconstructstatisticalmodelsoverstringsandtrees.(BL-3)
CO4	DefineNLP andNLP algorithms.(BL-1)
CO5	Evaluatedifferent languagemodelingTechniques.(BL-5)
CO6	AnalyzeapplicationsofNLP.(BL-4)

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	1									1	1	1
CO2	1	2	3										2	1
CO3	2	3	1	1							1		1	2
CO4	1	2	3										2	1
CO5	2	3	1										1	2
CO6	2	3	1									1	1	2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	Introductiontonaturallanguage	8HOURS

IntroductiontoNaturalLanguage,ApplicationsofNLP,CorporaandCorpusAnalysis,LexiconandMorphology, SyntaxandSemantics.

Atthe endoftheModule1,studentswillbeableto:

1. Understandapplicationsofnaturallanguageprocessing.
2. Describelexiconandmorphology.
3. DistinguishbetweenSyntaxandSemantics.

MODULE-2	SyntaxandSemanticanalysis	8HOURS

SyntaxAnalysis: ParsingNaturalLanguage,Treebanks:AData-DrivenApproachtoSyntax,RepresentationofSyntacticStructure, ParsingAlgorithms,ModelsforAmbiguityResolutioninParsing,MultilingualIssues **SemanticParsing:**Introduction,SemanticInterpretation,SystemParadigms,WordSenseSystems,Software.		
Atthe endoftheModule2,studentswillbeableto: 1. Identifyandanalyzeparsingtext. 2. Analyzeandapplythemodelsforambiguityresolutioninparsing. 3. Identifysemanticparsing.		
MODULE-3	**LanguageModeling**	**8HOURS**
Introduction,n-grammodels,Smoothing:InterpolationandBack-off.		
Atthe endoftheModule3,studentswillbeableto: 1. Analyzelanguagemodeling. 2. Identifyandapplyn–grammodels. 3. Determineinterpolation.		
MODULE-4	**MachineTranslation**	**8HOURS**
Predicate-ArgumentStructure,MeaningRepresentationSystems,Software.IntroductiontoMachineTranslation:History,RuleBasedMT,DirectTransfer&INTERLINGUAApproaches,MTEvaluation.		
Atthe endoftheModule4,studentswillbeableto: 1. Identifyandanalyzepredicatesinstatement. 2. AnalyzeMachinetranslation. 3. RecognizeINTERLINGUAmethods.		
MODULE-5	**StatisticalMachinetranslation**	**8HOURS**
ParallelCorpusandAlignment,LexicalTranslationModel,DecodingAlgorithms.		
Atthe endof theModule5, studentswillbeableto: 1. IdentifyStatisticalmachinetranslation. 2. DetermineLexicalTranslationmodel. 3. Identifyandapplydecodingalgorithms.		
MODULE-6	**Applications**	**8HOURS**
AutomaticTextCategorization,TextSummarization,InformationExtraction,SentimentAnalysis.		
Atthe endof theModule6, studentswillbeableto: 1. AnalyzeAutomatictextcategorization. 2. Analyzetextclassification. 3. Analyzeinformationextraction.		
	Totalhours:	**48hours**

Termwork:

1. NLPAPPLICATIONS: ExplainhowtheNLPusedinbusinessapplicationsandalsodemonstratethe importance of derivational morphology to later language development and has led to a consensus thatderivationisalexicalprocess.

2. SYNTAX AND SEMANTICS: Describe an algorithm for open text shallow semantic parsing toidentifysemantic relations between words in open text, as well as shallow semantic features associated withconceptsinthetext.

3.MODELINGLANGUAGE: Creating**interpolatingpolynomialonthe unitcircle**byprojectingthezerosofcertain polynomials vertically on the unit circle as well as **reading their convergence behaviour** for thefunctionsanalyticinsidethe unitcirclecanhowbeseen forthe**applicationpartinthereallife.**

4. MACHINE TRANSLATION: Create a story by taking turns coming up with two sentences**.** Each sentencecontains words from a category from the list 'VAKOG.' Visual, Auditory, Kinesthetic, Olfactory andGustatory**.**

5. TEXT CLASSIFICATION AND DECODING: Determine how the predicates can be used in realapplicationsandexplainhowtoconfigureanencoder-decodermodelforneuralmachinetranslation.

Contentbeyondsyllabus:

Languagelearningviadialogue-basedandinteractivegames,SolvingNLPtaskswithclassifiers,vector spacemodel.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Introduction toNaturalLang uage	CO1	https://towardsdatascience.com/introduction-to-natural- language-processing-for-text-df845750fb63https://www.geeksforgeeks.org/introduction-to-natural-language-processing/
2	Parsingnaturallangua geprocessing	CO2	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm https://www.pluralsight.com/guides/text-parsing
3	N– grammodel	CO3	https://towardsdatascience.com/introduction-to-language-models-n-gram-e323081503d9 https://www.depends-on-the-definition.com/introduction-n-gram-language-models/
4	Machinetransl ation	CO4	https://www.coursera.org/lecture/language-processing/introduction-to-machine-translation-nv7Crhttps://towardsdatascience.com/introduction-to-machine-translation-9cb0e93e7cb
5	Decoding algorithms	CO5	https://machinelearningmastery.com/beam-search-decoder-natural-language-processing/
			language-generation-fbba7cba2c5b
6	Textcategorization	CO6	https://medium.com/data-from-the-trenches/text-classification-the-first-step-toward-nlp-mastery-f5f95d525d73

TextBook(s):

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. BikelandImedZitouni,PearsonPublication
2. NaturalLanguageProcessingandInformationRetrieval:TanvierSiddiqui,U.S.Tiwary.
3. NaturalLanguageProcessing:AnInformationAccess Perspective‖,EssEssPublications,KaviNarayana Murthy, 2006.
4. FoundationsofStatisticalNaturalLanguageProcessing‖,ChristopherManning,MITPress, 1999.

ReferenceBook(s):

1. SpeechandNaturalLanguageProcessing-DanielJurafsky&JamesHMartin,PearsonPublications.
2. JamesA..NaturallanguageUnderstanding2e,PearsonEducation,1994
3. BharatiA.,SangalR.,ChaitanyaV..Naturallanguageprocessing:aPaninianperspective,PHI,2000
4. SiddiquiT.,TiwaryU.S..NaturallanguageprocessingandInformationretrieval,OUP,2008

OnlineResources/webreferences:

1. https://www.nltk.org/book/
2. https://bookauthority.org/books/new-natural-language-processing-ebooks.
3. https://www.geeksforgeeks.org/introduction-to-natural-language-processing/
4. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm
5. https://nptel.ac.in/courses/106/105/106105158/

NARAYANAENGINEERINGCOLLEGE::NELLORE								
20MC318	SOFTWAREQUALITYASSURANCE							R2020
Semester	Hours /Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite: ACourseon"SoftwareEngineering".

CourseObjectives:

- TounderstandthebasicprinciplesofsoftwarequalityandqualityfactorS.
- TobeexposedtotheSoftwareQualityAssurance(SQA) architectureandthedetailsof SQAcomponents.
- TounderstandhowtheSQAcomponentscanbeintegratedintotheprojectlife cycle.
- Tobefamiliarwiththesoftwarequality infrastructure.
- Tobeexposedtothemanagementcomponentsofsoftwarequality.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Demonstrate knowledge on quality, architecture, metrics of software development**.[BL:2]**
CO2	Analyzesoftwarequalityplanforasoftwareprojecttoincludesectionsonchangemanagement,configurationmanagement,defectelimination,validationandverification and measurement.**[BL:3]**
CO3	Designsoftwarequalityplansforasoftwareprojectandassestheircapabilitytoadopt qualitystandards.**[BL:3]**
CO4	Assess thequalityofsoftwareproductusingsoftwarequality metrics**.[BL:3]**
CO5	AdaptProceduresandworkinstructions,Templates,Checklistsand3Sdevelopmentfor softwarequalityinfrastructure.**[BL:2]**
CO6	CommittoethicstoapplyISOandIEEEstandardsinpreparingthequalityplanand documents.**[BL:2]**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3		3	2	3								2	
CO2	2	2	3	2	3								1	
CO3	2	1	2	2	2								2	2
CO4	2	2	2	2	1								2	
CO5	2	2	1	2	2								1	
CO6	2	2	2	1	1			3					1	

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	Introduction toQuality	8 HOURS

Historical Perspective of Quality, What is Quality? Definitions of Quality, Core Components of Quality,QualityView,FinancialAspectofQuality,Customers,SuppliersandProcesses,TotalQualityManagement (TQM), Quality Principles of Total Quality Management, Quality Management ThroughStatistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous)ImprovementCycle,QualityinDifferentAreas,BenchmarkingandMetrics,ProblemSolving Techniques,ProblemSolvingSoftwareTools.

Atthe endof theModule1,studentswillbeableto:

1. DefineQuality.[BL:1]
2. Explaincorecomponentsofquality. [BL:2]
3. Explainproblemsolvingsoftwaretools.[BL:2]

MODULE-2	IntroductiontoSoftwareQuality&Architecture	8 HOURS
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition andobjectives – Software quality factors- McCall‟s quality model – SQA system and architecture – SoftwareProjectlifecycleComponents–Preprojectqualitycomponents– Developmentandqualityplans.		
Atthe endof theModule2,studentswillbeableto: 1. Explainneedforsoftwarequality.[BL:2] 2. ExplainMcCall‟squalitymodel.[BL:2] 3. ExplainSoftwareProjectlifecycleComponents.[BL:2]		
MODULE-3	**SQAComponentsandProjectLifeCycle**	**8 HOURS**
SoftwareDevelopmentmethodologies–Qualityassuranceactivitiesinthedevelopmentprocess-Verification&Validation–Reviews–SoftwareTesting–SoftwareTestingimplementations–Qualityof software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE toolsforsoftwarequality –Softwaremaintenancequality –ProjectManagement.		
Atthe endof theModule3,studentswillbeableto: 1. Defineverificationandvalidation.[BL:1] 2. Explainqualityassurancetools.[BL:2]		
MODULE-4	**SoftwareQualityInfrastructure**	**8 HOURS**
Procedures and work instructions – Templates – Checklists – 3S developmenting – Staff training andcertification Corrective and preventive actions – Configuration management – Software change control –Configurationmanagementaudit-Documentationcontrol–Storageandretrieval.		
Atthe endof theModule4,studentswillbeableto: 1. Explainproceduresandworkinstructions.[BL:2] 2. Explainconfigurationmanagementaudit.[BL:2]		
MODULE-5	**SoftwareQualityManagement&Metrics**	**8 HOURS**
Projectprocesscontrol–Computerizedtools-Softwarequalitymetrics–Objectivesofqualitymeasurement – Process metrics – Product metrics – Implementation – Limitations of software metrics –Cost of softwarequality–Classicalqualitycostmodel– Extended model–ApplicationofCostmodel.		
Atthe endof theModule5,studentswillbeableto: 1. Explainsoftwarequalitymetrics.[BL:2] 2. Explaintheobjectivesofqualitymeasurement.[BL:2] 3. Whatarethelimitationsofsoftwaremetrics?[BL:1]		
MODULE-6	**Standards,Certifications&Assessments**	**8HOURS**
Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM andCMMI assessmentmethodologies - Bootstrap methodology – SPICE Project – SQA project processstandards–IEEEst1012&1028–OrganizationofQualityAssurance–Departmentmanagement responsibilities–Projectmanagementresponsibilities–SQAunitsandother actorsinSQAsystems.		
Atthe endof theModule6,studentswillbeableto: 1. Explainqualitymanagementstandards.[BL:2] 2. Explainprojectmanagementresponsibilities.[BL:2]		
	Totalhours:	**48HOURS**

Contentbeyondsyllabus:

1.ApplicationLife-CycleManagement-SecureApplicationDevelopment.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	CO	Reference

1	SQAComponents	CO1	https://www.tutorialspoint.com/software_quality_management/software_quality_management_sqa_components.htm#:~:text=Advertisements,defined%20or%20standardized%20quality%20specifications.
2	Softwarequalitychallenges	CO2	https://www.slideshare.net/HelmySatria/lecture-1-31203638
3	Softwaredevelopmentmethodologies	CO3	https://youtu.be/aX4_s5_Hroc
4	Storageandretrieval	CO4	https://www.researchgate.net/publication/3837365_Storage_and_retrieval_of_software_components_using_aspects
5	Managementaspectsof Quality	CO5	https://nptel.ac.in/courses/110/104/110104080/
6	Qualitymanagementstandards	CO6	https://www.tutorialspoint.com/software_testing_dictionary/quality_management.htm

TextBook(s):

1.DanielGalin,"SoftwareQualityAssurance",PearsonPublication,2009.

ReferenceBook(s):

1. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press,1997.
2. Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", InternationalThompsonComputerPress,1997.
3. SoftwareQualityAssurance–Principles&Practices,2016,NinaS&Godbole,AlphaScienceInternationalLtd.
4. HandbookofSoftwareQualityAssurance,4/e, GordonSchulmeyer,ArtechHouse.

OnlineResources:

1. www.inf.ed.ac.uk/teaching/.../notes/LectureNote20_SoftwareQuality.pdf
2. www.cs.toronto.edu/~yijun/csc408h/handouts/lecture5.pdf
3. web.uettaxila.edu.pk/CMS/SP2012/.../notes%5CSQA%20Lec_2.pdf
4. www.facweb.iitkgp.ernet.in/~spp/lect14.ppt
5. www.etsmtl.ca/Professeurs/.../Teaching-Software-Quality-Assurance.pdf

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC319	RESEARCHMETHODOLOGY							R2020
Semester	Hours/ Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

1. Tounderstandresearchapproaches.
2. Tounderstanddifferentclassesofdataandstatisticalmeasures.
3. Tounderstandanalysisofdataandvarioustypesofresearchdesignsanditscasestudies.
4. Tounderstandtypesofresearchhypothesisandtestprocedures.
5. Tounderstandhowtopresentdata.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Identifytheobjectivesofresearchandbestsuitableresearchapproachtodeviceanew application.(BL-1)
CO2	Applyvariousstatisticalmeasures toknowtheimportanceofdata.(BL-3)
CO3	Identifytheneedforresearchdesignandtodeliverthenecessaryevidencetoanswerthe researchproblem.(BL-1)
CO4	Applyvariousresearchhypothesistestsandtofindcorrectsolution.(BL-3)
CO5	Understandvarioustestproceduresforanalyzingthedataandtoretrieveresults.(BL-2)
CO6	Understandvarious presentationreportstoofferworkinqualitativeway.(BL-2)

CO-POMapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	1	3	2	2									1	1
CO2	3	2	2	2									1	2
CO3	1												2	2
CO4	3	1	2										1	1
CO5	3	1	2										2	2
CO6			2	1									1	
1:Low,2-Medium,3-High														

COURSECONTENT		
MODULE–1	**INTRODUCTION**	**8HOURS**

Introduction:

ObjectivesofResearch;DefinitionandMotivation;TypesofResearch;ResearchApproaches;Steps inResearchProcess;CriteriaofGoodResearch,EthicsinResearch.

ResearchFormulationandLiteratureReview:

ProblemDefinitionandFormulation;LiteratureReview;Characteristicsofa GoodResearchQuestion;Literature ReviewProcess.

AttheendoftheModule1,studentswillbeableto:

1. KnowResearchDefinitionandobjectivesof researchwork
2. Understandstepsinvolvedinresearchprocesstoobtainarightsolution.
3. Defineresearchproblemandcanformulatetheproblem

MODULE-2	**DATAACQUISITIONMETHODS**	**8HOURS**

DataCollection: PrimaryandSecondaryData;PrimaryandSecondaryDataSources;DataCollectionMethods;DataProcessing;ClassificationofData. BasicStatisticalMeasures: TypesofScales;MeasuresofCentralTendency;Skewness;Measure ofVariation;ProbabilityDistribution.		
AttheendoftheModule2,studentswillbeableto: 1. Understandvariousmethodsofdatacollection 2. LearnDifferentclassificationsofdata 3. Differenttypesofscalesandthedefinitionofprobabilitydistribution		
MODULE-3	**DATAANALYSIS&RESEARCHDESIGN**	**8HOURS**
DataAnalysis: StatisticalAnalysis;MultivariateAnalysis;CorrelationAnalysis;RegressionAnalysis;PrincipleComponentAnalysis;Sampling. ResearchDesign: NeedforResearchDesign;FeaturesofaGoodDesign;TypesofResearchDesigns; InductionandDeduction.		
Attheendofthe Module3,studentswillbeableto: 1. Thedefinitionofstatisticalanalysisanditstypes 2. Thedetaileddescriptionregardingtheneedfordesignofresearch 3. Thevarioustypesofresearchdesignsanditscasestudies		
MODULE-4	**RESEARCHHYPOTHESIS**	**8HOURS**
HypothesisFormulationandTesting: Hypothesis;ImportantTerms;TypesofResearchHypothesis;Hypothesis Testing;Z-Test;t-Test;f-Test; MakingaDecision:TypesofErrors;ROCGraphics.		
AttheendoftheModule4,studentswillbeableto: 1. Thedescriptionofhypothesisanddefinitionsofvariousimportantterms 2. Thevarioustypesofresearchhypothesis 3. Thedescriptionoftypesoferrorsin making adecision		
MODULE-5	**TESTPROCEDURES**	**8HOURS**
TestProcedures: ParametricandNon-ParametricTests;ANOVA;Mann-WhitneyTest;Kruskal-Wallis Test;Chi-SquareTest;Multi-VariateAnalysis.		
AttheendoftheModule5,studentswillbeableto: 1. Thedefinitionofparametricandnon-parametrictests 2. Thedetailedexplanationofvarioustestproceduresandtheirperformance.		
MODULE-6	**PRESENTATION**	**8HOURS**

ModelsforScienceandBusiness:AlgorithmicResearch;MethodsofScientificResearch;Modelling;Simulations;IndustrialResearch.
PresentationoftheResearchWork:BusinessReport;TechnicalReport;ResearchReport;General Tips for Writing Report; Presentation of Data; Oral Presentation; Bibliography andReferences;IntellectualPropertyRights;Open-Access Initiatives;Plagiarism.

AttheendoftheModule6,studentswillbeableto:

1. Thedescriptionofsocialscienceapproachesanditstypes
2. Thedetailedexplanation ofethicsandpoliticsinsocialresearch
3. Thedescriptiononhow to presentationthedata.
4. ThedescriptionofIPRandplagiarism

Totalhours:	**48hours**

Termwork:

PrepareaResearchPapertomeetallthefeaturesofresearchmethodologies.

1. Objectives ofResearch:Todescribewhatfactorsfarmerstakeintoaccountinmakingsuchdecisionsaswhether toadoptanewtechnologyorwhatcropstogrow.
2. Data collection : Describe the data collection activity itself (interviews, surveys, libraryresearch,etc.) AND why this specific form of data collection was chosen. Be sure to explain why you thinkthiskindofdatawillhelpyouinyourdesignprocess.
3. Data analysis: To find out the "importance of resident doctor in a company," the collecteddata isdivided into people who think it is necessary to hire a resident doctor and those who think it isunnecessary. Compare and contrast is the best method that can be used to analyze the polls havingsingleanswerquestionstypes.
4. Hypothesis Testing : A sample of 200 people has a mean age of 21 with a population standarddeviation(σ)of5.Testthehypothesisthatthepopulationmeanis18.9atα=0.05.
5. Test Procedures : Consider a Phase II clinical trial designed to investigate the effectiveness of anewdrugtoreducesymptomsofasthmainchildren.Atotalofn=10participantsarerandomizedtoreceive either the new drug or a placebo. Participants areasked to record the number of episodes ofshortness of breath over a 1 week period following receipt of the assigned treatment. The data areshownbelow.sthereadifferenceinthenumberofepisodesofshortnessofbreathovera1 week period inparticipants receiving the new drug as compared to those receiving the placebo? Byinspection,itappearsthat participantsreceiving theplacebohavemoreepisodesofshortnessofbreath,butisthisstatisticallysignificant?
6. Industrialresearch: Howcanyoujustifythatdeeplearningcanreduceriskfactorsi.e.,cost,time,quality,andsafety risksetc.,inIndustries.

Contentbeyondsyllabus:

1.IntellectualPropertyRights(IPR)

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	IntroductiontoResearch	https://www.academia.edu/6434288/Research_Methodology_An_Introduction https://prothesiswriter.com/blog/how-to-formulate-research-problem

2	StatisticalMeasures	https://www.statisticssolutions.com/dissertation-consulting-services/methodology/https://people.uwec.edu/piercech/researchmethods/data%20collection%20methods/data%20collection%20methods.htm
3	ResearchDesign	https://research-methodology.net/research-methodology/research-design/https://us.sagepub.com/sites/default/files/upm-binaries/57848_Chapter_3_Morgan_Integrating_Qualitative_and_Quantitative_Methods_2.pdf
4	ResearchHypothesis	https://www.slideshare.net/drjayeshpatidar/research- hypothesis-20719840 https://www.soas.ac.uk/cedep-demos/000_P506_RM_3736-Demo/unit1/page_25.htm
5	TestProcedures	https://www.slideshare.net/onlyuforu3/research-methodology-iiihttps://www.slideshare.net/saiprakash6/distinguish-between-parametric-vs-nonparametric-test

6	ResearchPresentation	https://slideplayer.com/slide/5930856/https://www.enago.com/academy/intellectual-property-rights-what-researchers-need-to-know/

TextBook(s):

1. ResearchMethodology -PearsonPublications–S.S.VinodChandra;S.AnandHareendran
2. ResearchMethodology:AStep-by-StepGuideforBeginners,RanjitKumar,SAGEPublications,2010,ThirdEdition.
3. Research Methodologies for beginners, kitsakorn Locharoenrat by Pan Standard, CRC Press,2016
4. ResearchMethodology:TheAims,Practices andEthicsofScience,PeterPruzanSpringerInternationalPublishing,2016

ReferenceBook(s):

1. ResearchMethodsforengineersbyDavidV. Thiel,GriffithUniversity,Queensland,CambridgeUniversityPress, 2014
2. ResearchMethodologybyR.PannerSelvam,secondedition,PHILearningPrivateLimited,2014
3. ResearchMethodlogy:ApracticalandScientificApproachbyVinayakBairagi,Mousami V.Munot,2019,CRCPress
4. EngineeringResearchMethodology:APracticalInsightforResearchersbyDipankarDeb,RajeebDey, ValentinaE.Balas,SpringerSingapore, 2019,firstEdition

OnlineResources:

1. https://www.ebooks.com/en-us/book/1754933/research-methods-for-engineers/david-v-thiel
2. https://www.cambridge.org/core/books/research-methods-for-engineers
3. https://www.pdfdrive.com/research-methodology-e33404795.html
4. https://www.pdfdrive.com/research-methodology-kl-university-e16011230.html

WebReferences:

1. https://us.sagepub.com/sites/default/files/upm-binaries/57848Chapter3_Morgan_IntegratingQualitative_and_Quantitative_Methods_2.pdf
2. https://www.slideshare.net/Marym123/research-methodology-an-introduction
3. https://www.slideshare.net/harshhanu/intellectual-property-rights-13551183
4. https://documents.pub/document/research-methodology-by-crkothari.html

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC320	BLOCKCHAINTECHNOLOGY							
Semester	Hours /Week			Totalhrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100
Pre-requisite:BasicknowledgeofNetworkSecurity,cryptography								

CourseObjectives:

1. ToUnderstandthe importanceof Blockchaintechnology
2. Familiarizethefunctional/operationalaspectsofcryptocurrency.
3. ToUnderstandemergingabstractmodelsforBlockchainTechnology
4. Identifymajorresearchchallengesandtechnicalgapsexistingbetweentheoryandpracti ceincryptocurrencydomain.
5. Developblockchainapplications.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Definethetypes,benefitsandlimitationofblockchain.
CO2	Explaintheblockchaindecentralizationandcryptographyconcepts.
CO3	ExtendtheBitcoinfeaturesanditsalternativeoptions
CO4	Applythesmartcontracts
CO5	Applyblockchainpolicies
CO6	Summarizetheblockchainfeaturesoutsideofcurrencies

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1													
CO2	1	1	1										1	
CO3	1	1	1		2	1							1	
CO4	2	2	2	1	2	2								2
CO5	2	2	3	1	3	2							2	
CO6	2		1	1	2	2								2

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	INTRODUCTIONTOBLOCKCHAIN	8HOURS

Distributedsystems, Historyof blockchainandbitcoin,Introductiontoblockchain, Typesofblockchain,Consensus,CAP theoremandblockchain,Benefits andlimitationsofblockchain.

Atthe endoftheModule1,studentswillbeableto:

1. Explainthehistoryofblockchain.
2. Explaintypesofblockchain.
3. Explianbenefits andlimitationsofblockchain

MODULE-2	DECENTRALIZATIONANDCRYPTOGRAPHY	8HOURS

Decentralization using blockchain, Methods of decentralization, Routes to decentralization,Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives,Asymmetric cryptography,Publicand private keys,Financialmarketsandtrading.

Atthe endoftheModule2,studentswillbeableto: 1. Analyzecryptographytechniques. 2. Explaindecentralizationmethods.		
MODULE-3	**BITCOINANDALTERNATIVECOINS**	**7HOURS**
Introduction, Digital Keys and Addresses, Transactions, Mining, Bitcoin Installation, AlternativeCoins-Theorithalfoundations,Bitcoinlimitations,Namecoin,Litecoin,Primecoin,Zcash.		
Atthe endoftheModule3,studentswillbeableto: 1. Explaindifferentbitcoins 2. Explainlimitations ofbitcoin 3. ExplainZcashtechniques.		
MODULE-4	**SMARTCONTRACTS&ETHEREUM**	**8HOURS**
History,Definition,Ricard contrscts,Ethereumblockchain,Elements ofEthereumblockchain,Precompiled contracts,Accounts, Ether,Messages,Mining,Clients and wallets,Tradingandinvestment.		
Atthe endoftheModule4,studentswillbeableto: 1. ExplainSmartcontractsmechanism 2. DiscussdifferentElementsofEthereum. 3. IdentifytypesEthereummechanism		
MODULE-5	**BLOCKCHAINAPPLICATIONDEVELOPMENT**	**10HOURS**
Hyperledger Fabric: Architecture, Identities and Policies, Membership and Access Control,Channels,TransactionValidation,writingsmartcontractusingHyperledgerFabric,Writingsmartcontractusing Ethereum,OverviewofRippleandCorda.		
AttheendoftheModule5,studentswillbeableto: 1. ExplainHyperledger protocol. 2. Writingsmartcontract usingHyperledgerFabric. 3. OverviewofRippleandCorda		
MODULE-6	**BLOCKCHAIN-OUTSIDEOFCURRENCIES**	**7HOURS**
InternetofThings, Government,Health,Finance,Media.		
Atthe endoftheModule6,studentswillbeableto: 1. ExplainblockchaininIoT 2. Explainblockchain inGovt,Health,Mediaetc.		
	Totalhours:	**48hours**

Termwork:

1) ImplementCAPTheorem.
2) Assignmentondecentralizationandcryptography.
3) Identifythesecurityandprivacyissuesinblockchain

Contentbeyondsyllabus:

1.PrivacyandSecuritymeasuresinBlockchaintechnology.

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference
1	Blockchianbasics	https://www.youtube.com/watch?v=QCvL-DWcojc
2	Decentralization	https://www.youtube.com/watch?v=WSN5BaCzsbo
3	Bitcoins	https://www.youtube.com/watch?v=gbHHxBcj-D0
4	Smartcontrast	https://www.youtube.com/watch?v=Fw9L54BvD2U
5	Block ChainApplications	https://www.youtube.com/watch?v=ydp3sj0N0GQ
6	Blockchain–outsidecurrency	https://www.youtube.com/watch?v=wpfo-Hqey

TextBook(s):

1. Imran Bashir, "Mastering Blockchain - Distributed ledgers, decentralization and smart contractsexplained",PacktPublishingLtd.,SecondEdition, ISBN978-1-78712-544-5,2017.
2. ArvindNarayanan,JosephBonneau,EdwardFelten,AndrewMiller,andStevenGoldfeder. ―Bitcoinandcryptocurrencytechnologies:acomprehensiveintroduction‖,PrincetonUniversityPress,2016.

ReferenceBook(s):

1. DanielDrescher,"BlockchainBasics:ANon-TechnicalIntroductionin25Steps",Apress,FirstEdition,2017.
2. AndreasM.Antonopoulos,"MasteringBitcoin:UnlockingDigitalCryptocurrencies",O'ReillyMedia,FirstEdition,2014.
3. MelanieSwan,―BlockChain:BlueprintforaNewEconomy‖,O'Reilly,2015
4. JoshThompsons, ―BlockChain:TheBlockChainforBeginners-GuidetoBlockchainTechnologyandLeveragingBlockChainProgramming‖, Apress,1stEdition, 2017

OnlineResources:

1. https://www.coursera.org/specializations/blockchain
2. https://www.udemy.com/topic/blockchain/
3. https://www.edx.org/learn/blockchain
4. https://www.class-central.com/tag/blockchain
5. https://cognitiveclass.ai/courses/blockchain-course/
6. https://www.skillshare.com/browse/blockchain

NARAYANAENGINEERINGCOLLEGE:NELLORE							
20MC321	EDGECOMPUTING						R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks	
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

1. Earlycomputing:Centralizedapplicationsonlyrunningononeisolatedcomputer
2. Personalcomputing:Decentralizedapplicationsrunninglocally
3. Cloudcomputing: Centralizedapplicationsrunningindatacenters.
4. Edge computing: Centralized applications running close to users, either on the device itself or onthenetworkedge.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Abilitytoincreasenetworkperformance byreducinglatency.
CO2	Understandthesecurityissuesintheedgeandthecloudenvironment
CO3	Understandcloud-basedtechnologyfor businessestoscaletheiroperations.
CO4	Describecentralized,privatedatacenters
CO5	Understandthesecurityadvantagesprovided byedgecomputing,
CO6	Describe primarynetwork,leadingtolowerlatencyand fasteroverallspeed.

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2		3											
CO2	1	2	2											
CO3	2	1			3	1					1			
CO4	2	2	2			2	3				1			
CO5	2	1	2			3	2				1			
CO6	2	2	1			2	3				2			

1:Low,2-Medium,3-High

COURSECONTENT

Module -1	Introduction	8Hours

EdgeComputing:introduction**,**EdgevsFogComputing,RealLifeApplicationOfEdgeTechnologyBenefitsOfEdgeComputing**,**EdgeCloudComputingServices**(10Hrs)**

AttheendoftheModule1,students willbeableto:

1. Analyzethecomponentsofedge anditsfogcomputing
2. EvaluatethevariousReal LifeApplicationOfEdge.
3. IdentifytheuseEdgeCloudComputingServices.

Module -2	BuildingBlock	8Hours

Edge Computing – A Building Block for Smart Applications of the Future, Challenges of Edge Computing,Edge Security Considerations, Basic Characteristics and Attributes,"CROSS" Value of Edge Computing,CollaborationofEdge ComputingandCloudComputing **.**

AttheendoftheModule 2,studentswillbeableto:

1. DiscusstheuseofChallengesofEdgeComputing.
2. UnderstandtheuseofBasicCharacteristicsandAttributes

Module -3	FunctionalServices	8Hours
FunctionView–ECN,ServiceFabric,CCF**,**DevelopmentServiceFramework(SmartService), DeploymentOperationServiceFramework(SmartService).		
AttheendoftheModule3,studentswillbeableto: 1. AnalyzetheFunctionView 2. DiscusstheuseofDevelopmentServiceFramework.		
Module -4	**ManagementServices**	**8Hours**
ManagementService,Full-LifecycleDataService,SecurityService,DeploymentView.ECCIndustryDevelopment and Business Practice - ECC Industry Development Overview , Cooperation Between the ECCandIndustryOrganizations**,**CooperationBetweentheECCandStandardizationOrganizations**(10Hrs)**		
AttheendoftheModule4,studentswillbeableto: 1. UnderstandtheManagementService. 2. AnalyzetheDevelopmentandBusinessPractice. **a.** UnderstandtheuseofCooperationBetweentheECCandStandardizationOrganizations**.**		
Module -5	**BusinessPracticesofEdgeComputing**	**8Hours**
BusinessPracticesofEdgeComputing-TheoryandPracticeofEdgeComputing,ImplementationofHorizontalSolutionsinVerticalIndustries RequirementsandPractices ofEdge Computing.**(10Hrs)**		
AttheendoftheModule5,studentswillbeableto: 1. ImplementBusinessPracticesofEdgeComputing. 2. ImplementationofHorizontalSolutions.		
Module -6	**EdgeComputingArchitecture**	**8Hours**
EdgeComputingReferenceArchitecture:Model-DrivenReferenceArchitecture,Multi-View Display.ConceptView- ECNs,DevelopmentFrameworks,andProductImplementation**,**EdgeComputingDomain Models.		
AttheendoftheModule 6,studentswillbeableto: 1. TounderstandthefeaturesEdgeComputingReferenceArchitecture 2. EdgeComputingDomainModels.		
Totalhours:		**48hours**

Termwork: AnycaseStudy On Edgecomputing

ContentbeyondsyllabusInternetofThings

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	Understanding thefundamentals ofedge computing.	CO1	**https://www.youtube.com/watch?v=3hScMLH7B4o**
2	Discussingthebasics ofedge computing	CO2	**https://www.youtube.com/watch?v=B2Pjzipnwxc**
3	Learning the conceptsof edgesecurityand resourcemanagement	CO3	**https://www.youtube.com/watch?v=EN4fEbcFZ_E**
4	Understanding theconceptsofedge computingViews	CO4	**https://www.youtube.com/watch?v=yRBe9YYCGw4**
5	Understandingthe BusinessPracticesof EdgeComputing	CO5	https://www.youtube.com/watch?v=0idvaOCnF9E

6	Understand the Edge ComputingReference Architecture	CO6	https://www.youtube.com/watch?v=RjMS15V_7nQ

TextBook(s):

1.EdgeComputingReferenceArchitecture2.0,EdgeComputingConsortium(ECC)andAllianceofIndustrialInternet(AII).

ReferenceBook(s):

1. MargaretChiosi,AT&T,DonClarke,PeterWillis,AndyReid,BT,Dr.ChunfengCui,Dr.HuiDeng,ChinaMobile,etc."NetworkFunctionsVirtualization—IntroductoryWhitePaper"
2. [WeisongShi,Fellow,IEEE,JieCao,StudentMember,IEEE,QuanZhang,StudentMember,IEEE,YouhuiziLi,andLanyuXu,"EdgeComputing:VisionandChallenges"
3. IECVerticalEdgeIntelligenceWhitepaper.OPCUnifiedArchitectureSpecification—Part1:OverviewandConcepts.OPCFoundation

OnlineResources:

1. http://www.iec.ch/whitepaper/edgeintelligence
2. https://www.youtube.com/watch?v=3hScMLH7B4o

WebResources:

1. https://www.youtube.com/watch?v=3hScMLH7B4o
2. https://www.youtube.com/watch?v=B2Pjzipnwxc
3. https://www.youtube.com/watch?v=EN4fEbcFZ_E
4. https://www.youtube.com/watch?v=yRBe9YYCGw4

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC322	DEEPLEARNING							R2020
Semester	Hours/Week			Total hrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:ArtificialIntelligence

CourseObjectives:

1. TounderstandthebasicprinciplesofAIandhistoryofDeepLearning.
2. Tounderstandhardwareandsoftwarerequirementsforimplementing DeepLearningalgorithms.
3. Tounderstandtheconceptsofclassificationmethods.
4. Tounderstandformsofregularizationintreatingnewdata.
5. Tounderstandthearchitectureofaspecializedneuralnetwork.
6. Tounderstandthenovelapplicationsandtrendsofdeeplearning.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandthemotivationbehindinventionofdeeplearning.**(BL-2)**
CO2	Understandtheconfigurationneedforimplementingdeeplearningstrategies.**(BL-2)**
CO3	Analyzevariousclassesofdeeplearningnetworks**(BL-4)**
CO4	Identifyregularizationstrategiestoreducetesterror.**(BL-1)**
CO5	Understandtheusage of specialkindofneuralnetworks.**(BL-2)**
CO6	Analyzeupcomingtrendsinnewlydevelopedalgorithms.**(BL-4)**

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	1						1		1		
CO2	3	2	1		1							1	2	
CO3	2	3	1	1						1		1	2	
CO4	2	3	1	1								1	3	
CO5	1	3	2							1		1		
CO6	3	3	1	1						1		1	2	1

1:Low,2-Medium,3-High

COURSECONTENT

MODULE–1	INTRODUCTION	8HOURS

Introduction: Whatisartificialintelligence(AI)anddeeplearning?, What isthehistoryofdeeplearningorAI?
Whydeeplearning?: Advantagesovertraditionalshallowmethods, Impactofdeeplearning
Themotivationofdeeparchitecture: Theneuralviewpoint,Therepresentationviewpoint-Distributedfeaturerepresentation,Hierarchicalfeaturerepresentation
Applications,futurepotentialandthecurrentchallenges

AttheendoftheModule1,studentswillbeableto:

- Understandoverviewofdeeplearning,Thehistoryofdeeplearning,
- Knowwhyshouldweresorttodeeplearningand whycan'ttheexisting machinelearningalgorithmssolvetheproblemathand?
- TheriseofDeep learninganditsrecentadvancesincertainfields.

MODULE–2	SETUPFOR DEEPLEARNING	8HOURS

Basicsoflinearalgebra: Datarepresentation,Data operations,Matrixproperties.
DeeplearningwithGPU: Deeplearninghardwareguide,CPUcores,CPUcachesize, RAMsize,Harddrive, Coolingsystems.
Deeplearningsoftwareframeworks: TensorFlowadeeplearninglibrary,Caffe,MXNet,Torch,Theano,MicrosoftCognitiveToolkit,Keras,Frameworkcomparison **.**

Atthe endoftheModule2,studentswillbeableto:

- UnderstandthefoundationsofDeepLearningTechnology
- AbletoknowHardwareguidetoDeepLearning
- UnderstandDeepLearningSoftwareFrameworks

MODULE-3	CLASSIFICATION	8HOURS

Three Classes of Deep Learning Networks :A three-way categorization, Deep networksforunsupervisedor generativelearning,Deepnetworksforsupervisedlearning,Hybriddeepnetworks.

Deep Feed forward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units,ArchitectureDesign,Back-PropagationandOtherDifferentiationAlgorithms,HistoricalNotes**.**

AttheendoftheModule3,studentswillbeableto:

- Identifyanddifferentiatebetweendifferentclassesofdeeplearningnetworks
- Abletounderstandarchitectureandfunctioningof neuralnetworks
- Knowsvarious trainingandlearningstrategiesusedinnetworks

MODULE-4	REGULARIZATION	10HOURS

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization,RegularizationandUnder-ConstrainedProblems,DatasetAugmentation,NoiseRobustness,Semi-SupervisedLearning,Multi-TaskLearning,Early Stopping,ParameterTying and ParameterSharing,SparseRepresentations,BaggingandOtherEnsembleMethods,Dropout, AdversarialTraining,TangentDistance,TangentProp,andManifoldTangentClassifier**(10H)**

AttheendoftheModule4,studentswillbeableto:

- Understandsmanyformsofregularizationavailabletothedeeplearning
- AbletodifferentiatebetweenParametricandNon-Parametricmethods
- Understandthecurseofdimensionalityandidentifiesthemethodstoresolveit

MODULE-5	CONVOLUTIONALNETWORKS	7HOURS

ConvolutionalNetworks:TheConvolutionOperation,Motivation,Pooling,ConvolutionandPoolingasanInfinitelyStrongPrior,VariantsoftheBasicConvolutionFunction,StructuredOutputs,DataTypes,EfficientConvolutionAlgorithms,RandomorUnsupervisedFeatures,TheNeuro-scientificBasisforConvolutionalNetworks,ConvolutionalNetworksandtheHistoryofDeepLearning**.**		
AttheendoftheModule5,studentswillbeableto: • Abletorememberandunderstandaspecializedkindofneuralnetworkforprocessingdata • IdentifyvariousalgorithmsusedtoimplementarchitectureofConvolutionalNetworks • AbletoanalyzetheimportanceofConvolutionalNetworksindeeplearning		
MODULE-6	**APPLICATIONS&TRENDS**	**7HOURS**
Applications: Large-ScaleDeepLearning,ComputerVision,SpeechRecognition,Natural Language Processing,OtherApplications**.** **DeepLearningTrends:**Novelapplications–Genomics,Predictivemedicine,Clinicalimaging,LipReading, VisualReasoning,CodeSynthesis.		
AttheendoftheModule6,studentswillbeableto: • Abletounderstandhowtousedeeplearningtosolveapplications • Abletoidentifynovelapplicationsofdeeplearninginvariousdomains • Abletoanalyzeresearchareawheredeep learningcanbeimplemented		
	Totalhours:	**48hours**

Termwork:

1. **ImpactofDL:**SurveythespecificrelationbetweenIoT dataandDLaswellasapplicationsofDLmethodsinIoT.
2. **DLsoftwareframeworks:**Presentcomparativestudyofvariousdeepleaningframeworksefficiencywithrespecttobothruntimeperformanceandaccuracy.
3. **TypesofDLnetworks:**CompareandcontrastdifferentDLnetworksandJustifywhichoneamongthemisbestbyelaboratingwitha realtimesituation.
4. **DataAugmentation:**HowtouseDLwhenwehaveLimitedData-Explainwithanexample.
5. **Convolutionalnetworks:**ConcedingthatDNNsmightpredictbrainactivityorbehaviourwell,Justify.
6. **DLinrealtime:** WhichDLnetworkscanbeusedtoaddsoundstomatchsilentvideos?Explain.

Contentbeyondsyllabus:

1. Handlingsomeknownweaknesses,suchastrapatlocal minima,lowerperformance,andhighcomputationaltime
2. how to deal with fast moving and streamed data, high dimensional data, structured data in the formof sequences (time series, audio and video signals, DNA, and so on), trees (XML documents, parsetrees,RNA,andsoon), graphs(chemicalcompounds,socialnetworks,partsofanimage,andsoon)

Self-Study:

Contentstopromoteself-Learning:

SNO	Topic	Reference

1	IntroductiontoDeep Learning	https://www.geeksforgeeks.org/introduction-deep-learning/#https://algorithmia.com/blog/introduction-to-deep-learning
2	SetupforDeepLearning	http://deeplearning.net/tutorial/deeplearning.pdf
3	Classification	https://www.guru99.com/deep-learning-tutorial.htmlhttps://towardsdatascience.com/deep-learning-feedforward-neural-network-26a6705dbdc7
4	Regularization	https://www.analyticsvidhya.com/blog/2018/04/fundamentals-deep-learning-regularization-techniques/
5	ConvolutionalNetworks	https://medium.com/@RaghavPrabhu/understanding-of-convolutional-neural-network-cnn-deep-learning-99760835f148
6	Applications&Trends	https://www.mygreatlearning.com/blog/deep-learning-applications/

TextBook(s):

1. DeepLearning EssentialsYourhands-onguide to thefundamentalsofdeeplearning andneuralnetwork modeling (English Edition) by Wei Di, Anurag Bhardwaj, Jianing Wei 2018Packt PublishingISBN 978-1-78588-036-0
2. Deep Learning Methods and Applications Li Deng and Dong Yu. This book is originally published asFoundationsandTrends®inSignalProcessingVolume7 Issues3-4,ISSN:1932-8346.
3. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and MachineLearningseries),MITPress.

ReferenceBook(s):

1. DeepLearning:APractitioner'sApproach1stEditionbyJoshPatterson,AdamGibson,2019,O'reilly
2. FundamentalsofDeepLearningDesigningNext-Generation MachineIntelligence AlgorithmswithcontributionsbyNicholasLocascioBeijingBostonFarnhamSebastopolTokyo,O'reilly ,2017
3. DeepLearningforcomputervisionwithpythonbyAdrianRosebrock,Pyimagesearch,2017

OnlineResources/WebReferences:

1. https://www.deeplearningbook.org/
2. https://www.deeplearningbook.org/lecture_slides.html
3. https://github.com/janishar/mit-deep-learning-book-pdf
4. https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-deep-learning?
5. https://cs231n.github.io/convolutional-networks/
6. https://www.cse.iitk.ac.in/users/sigml/lec/Slides/Ram.pdf
7. https://www.coursera.org/specializations/deep-learning
8. http://web.stanford.edu/class/cs224n

NARAYANAENGINEERINGCOLLEGE:NELLORE								
20MC323	SOFTWARE TESTING							R2020
Semester	Hours/Week			Totalhrs	Credit	MaxMarks		
	L	T	P		C	CIE	SEE	TOTAL
III	3	0	0	48	3	40	60	100

Pre-requisite:Nil

CourseObjectives:

- Fundamentalsforvarioustestingmethodologies.
- Describetheprinciplesandproceduresfordesigningtestcases.
- Providesupportstodebuggingmethods.
- Actsasthereferenceforsoftwaretestingtechniques andstrategies.

CourseOutcomes:Aftersuccessfulcompletionofthecourse,thestudentwillbeableto:

CO1	Understandthebasictestingprocedures.
CO2	Abletosupportin generatingtestcasesandtestsuites.
CO3	Abletotesttheapplicationsmanuallybyapplyingdifferenttestingmethodsandautomationtools.
CO4	Applytoolstoresolvetheproblems inRealtimeenvironment.
CO5	Understandthebasictestingprocedures.
CO6	Abletosupportin generatingtestcasesandtestsuites.

CO-POMapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1										1	
CO2	2	1	2	1	2								2	2
CO3	1		1											1
CO4	2	1			1	1							2	
CO5	1	2	2										1	2
CO6	1													

COURSE CONTENT

MODULE–1	Flowgraphsand Path testing	8Hours

Introduction: PurposeofTesting,Dichotomies,ModelforTesting, ConsequencesofBugs,TaxonomyofBugs. BasicsConceptsofPathTesting,Predicates,PathPredicatesandAchievablePaths,PathSensitizing,PathInstrumentation,ApplicationofPathTesting.

AttheendoftheModule1,studentswillbeableto:

1. Discussmodelfortesting.
2. Explainthedifferenttypesofbugs.
3. Discussaboutpathpredicates&pathsensitizemethods.

MODULE-2	Transaction FlowTesting&DataflowTesting	8Hours

Transaction Flow Testing Introduction, Transaction Flows, Transaction Flow Testing Techniques.BasicsofDataflowTesting,Strategies inDataflowTesting,ApplicationofDataflowTesting.

AttheendoftheModule1,studentswillbeableto:

1. Whatisatransactionflowtesting?
2. Explaindifferenttestingtechniques.
3. Definedataflowtestingstrategies.

MODULE-3	DomainTesting	8Hours

Domainsand Paths,Nice&UglyDomains,Domain testing,DomainsandInterfacesTesting,DomainandInterfaceTesting,DomainsandTestability.		
AttheendoftheModule1,studentswillbeableto: 1. Explaindomaintesting. 2. Differenceb/wdomainandinterfacetesting 3. Howtoidentifybugsarenice/uglydomainbugs.		
MODULE-4	**Paths, PathproductsandRegularexpressions**	**8Hours**
PathProducts&PathExpression,ReductionProcedure,Applications,RegularExpressions& FlowAnomalyDetection.		
AttheendoftheModule1,studentswillbeableto: 1. Whatisapath,pathexpressions? 2. Explainaboutreductionprocedure. 3. Explaindifferenttypesofapplicationsinreductionprocedure.		
MODULE-5	**LogicBasedTesting**	**8Hours**
Overviewoflogicbased testing,DecisionTables,PathExpressions,KVCharts,Specifications. **State,StateGraphsandTransitionTesting:**StateGraphs,Good&BadStateGraphs,StateTesting,TestabilityTips.		
AttheendoftheModule1,studentswillbeableto: 1. ExplainKVCharts. 2. Explainstategraphs. 3. Discussaboutdecisiontables.		
MODULE-6	**LogicBasedTesting**	**8Hours**
MotivationalOverview,MatrixofGraph,Relations,PowerofaMatrix,NodeReductionAlgorithm,BuildingTools.		
AttheendoftheModule1,studentswillbeableto: 1. Whatisapowerofamatrix. 2. Explainnodereductionalgorithms. 3. Whatis graphs.		
	Totalhours:	**48hours**

Contentbeyondsyllabus:Quality Assurance

Self-Study: Contentstopromoteself-Learning:

SNO	Topic	CO	Reference
1	**Flow graphs and Pathtesting**	CO1	https://www.youtube.com/watch?v=t-C3Bt7f1M8
2	**TransactionFlow Testing & DataflowTesting**	CO2	https://www.youtube.com/watch?v=581VLmAb3GE
3	**DomainTesting**	CO3	**https://www.youtube.com/watch?v=TEzF7pk0rIY**
4	**Paths,Pathproductsa nd Regular expressions**	CO4	**https://www.youtube.com/watch?v=H_zkA0korRA**
5	**LogicBasedTesting**	CO5	https://www.youtube.com/watch?v=hWbwpTNyftk
6	**LogicBasedTesting**	CO6	https://www.youtube.com/watch?v=ZOwjorEKJRU

TextBook(s):

1. Softwaretestingtechniques–BorisBeizer,Dreamtech,secondedition

ReferenceBook(s):

1. Thecraftofsoftwaretesting-Brian Marick,PearsonEducation.
2. SoftwareTesting-YogeshSingh,Camebridge
3. SoftwareTesting,3rdedition,P.C.Jorgensen,Aurbach Publications(Dist.bySPD).
4. SoftwareTesting,N.Chauhan,OxfordUniversityPress.
5. IntroductiontoSoftwareTesting, P.Ammann&J.Offutt, CambridgeUniv.Press.

Online Resources:

1. http://www.softwaretestinghelp.com/practical-software-testing-new-free-ebook-download/
2. http://www.guru99.com/software-testing.html3.http://www.fromdev.com/2012/04/8-best-software-testing-books-every-qa.html
4.https://onlinecourses.nptel.ac.in/noc16_cs16/preview

WebResources:

1. http://www.qatutorial.com/?q=Software_Test_Metrics
2. http://softwaretestingfundamentals.com/MODULE-testing/
3. http://qainsights.com/challenges-in-test-automation/
4. http://www.softwaretestinghelp.com/manual-and-automation-testing-challenges/