Barrackpore Rastraguru Surendranath College

Teaching Plan

Department of Computer Science

2022-23

NAMEOFTHEPROGRAMME

B.Sc.HonourswithComputerScience

PROGRAMMEOUTCOME

- Develop ability to analyze a problem, identify and define the computingrequirements,whichmaybeappropriatetoitssolution.
- Topreparestudentstoundertakecareersinvolvingproblemsolvingusi ng computerscience
- andtechnologies.
- An ability to apply knowledge of computing and mathematics appropriatetothediscipline.
- An ability to identify, formulate, and develop solutions tocomputational challenges.
- Anabilitytodesign,implement,andevaluateacomputationalsystemto meet desiredneedswithin realistic constraints.
- Anabilitytofunctioneffectivelyonteamstoaccomplishsharedcomputi ng design,evaluation,orimplementation goals.
- Anunderstandingofprofessional,ethical,legal,security,andsocial issuesandresponsibilitiesforthecomputingprofession.
- Anabilitytocommunicateandengageeffectivelywithdiversestakehold ers.
- Anabilitytoanalyzeimpactsofcomputingonindividuals,organizations, andsociety.
- Recognitionoftheneedforandabilitytoengageincontinuingprofession al development.
- An ability to use appropriate techniques, skills, and tools necessary forcomputing practice.
- An ability to apply mathematical foundations, algorithmic principles,andcomputersciencetheoryinthemodelinganddesignofco mputationalsystemsina way thatdemonstratescomprehension ofthetradeoffsinvolved indesign choices.
- Anabilitytoapplydesignanddevelopmentprinciplesintheconstructio nofsoftwaresystems ofvarying complexity.

Semester	**I**				
CourseTitle	**ProgrammingFundamentalusingC/C++**				
CourseCode	**CMSACOR01T**	**Credit**	**4**		
CourseOutcome	Aftercompletion ofthecoursethestudents will beable to: 1. To understand procedure oriented language and object orientedlanguage,their advantages,disadvantagesandapplications. 2. To understand the use of data types, variables, arithmeticoperators,conditionalstatements andloop structures. 3. Tousestandardinput/out,fileinput/outputoperations, 4. To use static memory allocation, dynamic memory allocation,arrayand pointer. 5. To develop function-oriented programs and object orientedprogramsto solvebasic problems.				
SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**BlendedMode(ICT+DirectTeaching)**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**Introduction to C and C++ : (3 Lectures)**Historyof Cand C++, Overview ofProceduralProgrammingandObject-Orientation Programming	**2**
1	Usingmain()function, CompilingandExecuting SimpleProgramsinC++	**3**

2	**DataTypes,Variables,Constants,Operators andBasic I/O :(5 Lectures)** Declaring, Defining and Initializing Variables,Scope of Variables, Using Named Constants,Keywords,DataTypes,CastingofDataTypes,	**4**
2	Operators(Arithmetic,LogicalandBitwise), UsingCommentsinprograms	**6**

2	Character I/O (getc, getchar, putc, putcharetc),FormattedandConsoleI/O(printf(),scanf(),cin,cout),Using BasicHeader Files (stdio.h, iostream.h,conio.hetc)SystemPrograms	**7**
3	**Expressions,ConditionalStatements andIterativeStatements:(5Lectures)** Simple Expressions in C++ (including UnaryOperatorExpressions, BinaryOperator Expressions),UnderstandingOperatorsPrecedencein Expressions	**9**
3	ConditionalStatements(ifconstruct,switch-case construct),Nestedstatement(conditional).	**11**
3	Understanding syntax and utility of IterativeStatements(while,do-while,andforloops),Use ofbreakandcontinueinLoops,NestedStatements(Iterative).	**13**
4	**FunctionsandArrays:(10Lectures)** Basicconcept,Utilityof functions,Differentiatingbetween Declaration and Definition of Functions,Functionsreturningvalue,Voidfunctions,Inline Functions,Returndatatypeoffunctions.	**14**
4	Functions parameters, Functions with variablenumber of Arguments, Call by Value, Call byReference,CommandLineArguments/Parameters inFunctions.	**16**
4	CreatingandUsingOneDimensionalArrays (Declaring and Defining an Array, Initializing anArray,AccessingindividualelementsinanArray,Manipulating array elements using loops), UseVarious types of arrays (integer, float andcharacterarrays/Strings),Searchingelements, Sortingelements.	**19**

4	Two-dimensionalArrays(Declaring,DefiningandInitializingTwoDimensionalArray,Workingwith Rows and Columns), Introduction to Multi-dimensionalarrays . Matrixaddition,Matrixmultiplication,Inverse ofamatrix,Introduction toMulti-dimensionalarrays.	**2** **2**
5	**Derived Data Types (Structures and Unions):(3Lectures)** Understanding utility of structures and unions,Declaring,initializingandusingsimple structuresandunions,Manipulatingindividualmembersof structuresandunions	**2** **4**

5	Array of Structures, Individual data members asstructures,Passingandreturningstructuresfr omfunctions, Structure with union as members,Unionwith structures asmembers	**25**
6	**Pointers and References in C++ : (7 Lectures)**Understanding a Pointer Variable, Simple use ofPointers(Declaringand DereferencingPointersto simplevariables),ProblemswithPointers.	**27**
6	Pointers to Pointers, Pointers to structures, Passingpointersas functionarguments, Returninga pointerfromafunction.	**29**
6	Usingarraysaspointers,Passingarraysto functions	**31**
6	Basicconcept,Pointersvs.References, Declaring andinitializingreferences,Usingreferencesasf unctionargumentsandfunctionreturnvalues.	**32**
	ClassTest	**33**
7	**Memory Allocation inC++:(3Lectures)** Static and dynamic memory allocation.Differentiatingbetweenthem,storageo fvariablesinstaticand dynamicmemoryallocation.	**34**
7	useofmalloc,callocandfree functions,useof newanddeleteoperators.	**36**
8	**File I/O, Preprocessor Directives : (4 Lectures)**Basic concepts:Opening and closing a file (use offstreamheaderfile,ifstream,ofstreamandfstrea mclasses), Reading and writing Text Files, Usingput(),get(),read()andwrite()functions,Ran dom accessinfiles,	**37**
8	Understanding the Preprocessor Directives(#include,#define,#error,#if,#else,#e lif,#endif,#ifdef,#ifndef and #undef), Macros.	**39**
9	**Using Classes in C++ : (7 Lectures)**PrinciplesofObject-OrientedProgramming,Defining & Using Classes, Class Variables&Functions,Objects,Objectsaspar	**41**

	ameters, SpecifyingtheProtectedandPrivateAccess.	
9	Basic concept,Class Constructors,Copy Constructors.	**4 3**
9	Functionoverloadingin classes,Constructor Overloading.	**4 4**
9	Basic concept,Template classesandtheiruses.	**4 5**

	Seminar	**47**
10	**Overview of Function Overloading andOperatorOverloading:(5Lectures)** NeedofOverloadingfunctionsandoperators, Overloadingfunctions bynumberand typeof arguments,	**48**
10	Looking at an operator as a function call,OverloadingOperators(includingassignmentoperators, unaryoperators).	**51**
11	**Inheritance,PolymorphismandExceptionHandling:(8 Lectures)** Introduction to Inheritance (Multi-LevelInheritance,Multiple Inheritance),	**53**
11	Polymorphism(VirtualFunctions,PureVirtual Functions),	**56**
11	Basics Exceptional Handling (using catch andthrow,multiplecatchstatements),Catchingall exceptions,Restrictingexceptions,Rethrowing exceptions.	**58**
	InternalAssessment	**60**

	Semester	**I**	
CourseTitle	**ComputerSystemArchitecture**		
CourseCode	**CMSACOR02T**	**Credit**	**4**

CourseOutcome	Bysuccessfulcompletion,studentswillhavetheknowledgeandskills to: i) Understanddemonstratecomputerarchitectureconceptsrelatedto design of modern processors, memoriesand I/Os. ii) Describe,analyzeand evaluatetheperformanceofbasiccomputers. iii) Todeveloptheconceptof logicfor assemblylanguageprogramming.

SchemeofInstruction					
TotalDuration	(60) lectures	**Class/Week**	4	**Hours/week**	4
InstructionMode	Face to face teaching process and also ICT based teaching-learningprocess.				

SchemeofExamination					
MaximumScore	50	**Internal**	8+2	**EndSemester**	40

CourseMapping

Units	**CourseContent**	**LectureHour (Cumulative)**

1.	**Introduction:**Logicgates,Booleanalgebra, combinationalcircuits,circuitsimplification,flip-	8lectures

	flopsandsequentialcircuits,decoders,multiplexers, registers,counters and memoryunits.	
2.	**Data Representation and Basic ComputerArithmetic:**Numbersystems,compl ements,fixedand floating point representation, characterrepresentation, addition, subtraction, magnitudecomparison, multiplication and division algorithmsforintegers.	10lectures
3.	**Basic Computer Organization and Design:**Computer registers, bus system, instruction set,timing and control, instruction cycle, memoryreference,input-output and interrupt,Interconnection Structures, Bus Interconnectiondesignof basic computer.	13lectures
4.	**Central Processing Unit:** Registerorganization, arithmetic and logical micro-operations,stackorganization,microprogramme dcontrol. Instruction formats, addressing modes,instruction codes, machine language, assemblylanguage, input output programming, RISC, CISCarchitectures,pipeliningandparallel architecture.	15lectures
5.	**MemoryOrganization:**Cachememory, Associativememory, mapping.	6lectures

6.	**Input-Output Organization:** Input / Output:External Devices, I/O Modules, Programmed I/O,Interrupt-Driven I/O, Direct Memory Access, I/OChannels.	8lectures

Semester			**II**		
CourseTitle	**ProgramminginJava**				
CourseCode	**CMSACOR03T**	**Credit**	**4**		
CourseOutcome	1. Developproblem-solvingandprogrammingskillsusingOOPconcept 2. Develop theabilityto solve real-world problems usingJava 3. DevelopefficientJavaappletsandapplicationsusingOOPconcept.				
SchemeofInstruction					
TotalDuration	60	**Class/Week**	15	**Hours/week**	4
InstructionMode	**DirectTeaching**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	JavaArchitectureandFeatures,Understandingthe semantic and syntax differences between C++ andJava, Compiling and Executing a Java Program,Variables, Constants, Keywords Data Types,Operators (Arithmetic, LogicalandBitwise)and Expressions,Comments,	2
1	Doing Basic Program Output, Decision MakingConstructs(conditionalstatementsandloops)andNesting, Java Methods (Defining, Scope, PassingandReturningArguments,TypeConversionand TypeandChecking,Built-inJavaClassMethods)	4

2	Creating&UsingArrays(OneDimensionandMulti-dimensional), Referencing ArraysDynamically	6

2	JavaStrings:TheJavaStringclass,Creating&UsingString Objects, Manipulating Strings, String Immutability &Equality,PassingStrings To&FromMethods	8
2	String Buffer Classes. Simple I/O usingSystem.outandtheScannerclass,Byte and Characterstreams	10
2	Reading/Writingfromconsoleandfiles.	12
3	PrinciplesofObject-OrientedProgramming, Defining&UsingClasses,ControllingAccesstoClassMembers, Class Constructors	14
3	MethodOverloading,ClassVariables&Methods,Objectsasparameters,finalclasses,Object class, GarbageCollection	16
4	Inheritance:(SingleLevelandMultilevel	18
4	MethodOverriding,DynamicMethodDispatch, AbstractClasses	20
4	InterfacesandPackages	22
4	Extendinginterfacesand packages,Packageand ClassVisibility	24
4	UsingStandardJavaPackages(util,lang, io,net),	26
4	Wrapper Classes, Autoboxing/Unboxing	28
4	EnumerationsandMetadata	30
	ClassTest	31
5	Exceptiontypes,uncaughtexceptions	33
5	throw,built-inexceptions	35
5	Creating yourownexceptions	37
5	Multi-threading:TheThreadclassandRunnable interface,	39
5	creatingsingleandmultiplethreads,Thread prioritization,synchronization and communication,suspending/resumingthreads	41
5	java.netpackage, OverviewofTCP/IPand Datagramprogramming	43
5	Accessingandmanipulatingdatabasesusing JDBC.	45
	StudentSeminar	48

6	JavaApplets:Introduction toApplets, Writing JavaApplets	50

6	WorkingwithGraphics, IncorporatingImages&Sounds.	52
6	EventHandlingMechanisms,Listener Interfaces, AdapterandInner Classes.	54
6	ThedesignandImplementationofGUIsusingtheAWT controls, Swing components of JavaFoundation Classes such as labels, buttons,textfields,layoutmanagers,menus,event sand listeners	56
6	Graphicobjectsfordrawingfiguressuchaslines, rectangles,ovals,usingdifferent fonts.Overviewofservlets.	58
6	**InternalAssessment**	60

	Semester	**SEMESTERII**	
CourseTitle	**DiscreteStructure**		
CourseCode	**CMSACOR04T**	**Credit**	**5**

<table>
<tr><td>CourseOutcome</td><td colspan="5">Aftercompletionofthecoursethestudentswillbeabl eto,

1. Acquire knowledge and understanding of theterms,symbols,concepts,principles,process es,proofs,etc.ofdiscretemathematics.
2. UnderstandthefundamentalstructureslikeS ets,Relations and,Functions.
3. UnderstandtheconceptofGrowthoffunction sandtherelatedconceptofasymptoticnotatio ns.
4. Develop skills to apply counting techniqueslikePermutation,Combination,Pige onholeprinciple,Principleof InclusionandExclusion.
5. Appreciate Graph as a combinatorialstructureandrealizeitsvastap plicability.
6. Relateacomputationalproblemwithagrapht heoreticproblemforitsbetterunderstanding.
7. Identifytherecurrencerelationsunderlyingi nvarious computationalproblems.
8. Develop skills to solve recurrence relations bydifferenttechniques.
9. UnderstandtheconceptsofPropositionallog icand relatethemwith otherconcepts.
10. Apply the mathematical knowledge inalgorithmdesign andcomplexityanalysis.</td></tr>
<tr><td colspan="6">SchemeofInstructio n</td></tr>
<tr><td>TotalDuration</td><td>15 weeks</td><td>Class/Week</td><td>4</td><td>Hours/wee k</td><td>4</td></tr>
<tr><td>InstructionMode</td><td colspan="5">DirectTeaching(withICT)+ Tutorial</td></tr>
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MaximumScore	50	**Internal**	0	**EndSemester**	50

CourseMapping		
Units	**CourseContent**	**LectureHour(Cumulative)**
1	Set — Definition, Representation by diagrams,Operations.Lawsofsettheory.	1
1	Sets of numbers (finite and infinite sets,uncountablyinfinitesets).Powerset,Cartesianproductof sets.	3
1	Principle of Inclusion and Exclusion (PIE):IllustrationofPIEusing2/3/4sets,Gen .PIE.	5
1	Mathematical Induction: Basic idea, Solution ofdifferenttypesofproblems—Settheoretic, Equations,Inequalities,Divisibilityproblems.	7
1	Binaryrelations:Properties—reflexivity, symmetry,transitivity,anti-symmetry,Closure. Equivalencerelations,PartialOrderingRelations.	9
1	Functions: Definition, Properties: one-to-one,onto,bijection.Inverseofafunction.Product offunctions.	11
1	PermutationandCombination:Selectingordered/unordered samples of k objects (with / withoutrepetition)from aset ofnobjects. Binomialandmultinomialtheorem.	13
1	Pigeon-holeprinciple:Basicformandgeneralizedform.Examples.	15
2	Growth of Functions: Illustration with examples.Asymptotic Notations — Introduction, usage andimportance.	17
2	Summation approximation by Integrals formulasandproperties:Illustrationwithsampleproblems	19
2	BoundingSummations	21

3	Recurrence Relations: Introduction, categories(homogeneous,non-homogeneous),examples.	25
3	Problemsolvingbygeneratingfunctions—Basicconcepts.	27
3	Solution of Linear Recurrence Relations withconstant coefficients: Solution by characteristicequations/substitutionMethod/generatingfunction	30
3	RecurrenceTrees,MasterTheorem.Examples,uses.	32
	ClassTest	33
4	Graph Theory: Basic Terminology, Models andTypes,multigraphsandweightedgraphs,GraphRepresentation.	35
4	Graphisomorphism:Labeledgraphsand isomorphism.Illustrations.Unlabeledgraphs.	37
4	Connectivity in graphs: Paths and Cycles,EulerandHamiltonianPathsandCircuits.	39
4	Sub-graph,Complementofagraph.Definitions,properties,examples.	41
4	Trees:BasicTerminology,properties.IntroductiontoSpanningTrees.	43
4	PlanerGraphs:Planerrepresentation,Euler'sformula,Planarity-testing,Statementof Kuratowski'stheorem,Dualofaplanergraph.	45
4	Graph Coloring: Vertex-coloring, Chromaticnumber,Independencenumberandcliquenumber	47
	Studentseminar	50

5	PrepositionalLogic:Introduction,Logicvariables, Connectives,Truthtable representation	52
5	Well-formedFormulas:Problemsandtheirsolution.	54

5	Tautologies:Problemsandtheirsolution.	56
5	Equivalences,InferenceTheory:Explanation ,examples	58
	InternalAssessment	60

Semester		**III**			
CourseTitle	**DataStructure**				
CourseCode	**CMSACOR05T**	**Credit**	**4**		
CourseOutcome	**Uponcompletion of thiscoursestudentwillbeableto** a) UnderstandtheconceptofDynamicmemorymanagement,datatypes,algorithms, Big Onotation. b) Understandbasicdatastructuressuchasarrays,linkedlists,stacksand queues. c) Describethehashfunctionandconceptsofcollisionanditsresolutionmethods d) Solveprobleminvolving graphs,trees andheaps e) ApplyAlgorithmforsolvingproblemslikesorting,searching,insertionand deletion ofdata				
SchemeofInstruction					
TotalDuration	60 Lectures	**Class/Week**	4	**Hours/week**	4
InstructionMode	InpersonteachingwithICTbasedteaching-learningprocedure				
SchemeofExamination					
MaximumScore	50(Theo)	**Internal**	8 +2 (Theo)	**EndSemester**	40 (Theo)
CourseMapping					
Units	**CourseContent**			**LectureHour(Cumulative)**	

1	**Arrays(5Lectures)**	

	Introduction to Array, 1D array, Indexing formula, Operations - Insertion, Deletion,Traversal,Merging,	1
	2Darray,Indexingformula,n-DarrayIndexing formula	3
	SparseandDensematrix,Representationof sparsematrix,Transpose ofsparsematrix	5
2	**Stacks(5Lectures)**	
	Implementationofstack usingarray,	6
	Applicationsofstack:Prefix,InfixandPostfix expressions,Utilityandconversionoftheseexpressionsfrom one to another	8
	LimitationsofArrayrepresentationofstack, Multistack	10
3	**LinkedLists(10Lectures)**	
	Singlylinkedlist:Insertion,Deletion,Traversal	11
	Polynomialrepresentationandoperationsusing singlylinkedlist	13
	Doublylinkedlist:Insertion,Deletion,Traversal	15
	Circularlinkedlist	17
	Selforganizinglist, Skiplist	19
4	**Queues(5Lectures)**	
	Arrayrepresentationof Queue	20
	LinkedrepresentationofQueue	22
	DeQue, Priorityqueue	24
5	**Recursion(5lectures)**	
	Recursion: Developing definition, Simple problemsand theirimplementation	25
	Advantagesand LimitationsofRecursion	27

	(InternalStackImplementation)	
6	**Trees(20Lectures)**	
	IntroductiontoTree;Variousterminologies	30
	Binarytree:Insertion,Deletion	32
	Binarysearchtree:Insertion,Deletion	34
	RecursiveandIterativeTraversalsonBinary SearchTrees	36
	ThreadedBinary Trees(Insertion, Deletion, Traversals	38
	ThreadedBinary Trees(Insertion, Deletion, Traversals	40
	Height-Balanced Trees (AVL Tree): Introduction	42
	Height-BalancedTrees (AVLTree):Operations	44
	Height-BalancedTrees (AVLTree):Operations	46
	RevisionandDoubtclearing	48
7	**SearchingandSorting(5Lectures)**	
	LinearSearch,BinarySearch,Comparisonof LinearandBinarySearch	50
	SelectionSort, InsertionSort	52
	ShellSort,ComparisonofSortingTechniques	54
8	**Hashing(5Lectures)**	
	Introduction to Hashing, Hash function, Differenttypes	55
	Deleting from Hash Table, Efficiency of RehashMethods, Hash Table Reordering, Collision anditsresolution,ResolvingcollisionbyOpen Addressing	57

	Coalesced Hashing, Separate Chaining, DynamicandExtendibleHashing,Choosinga	60

	HashFunction,PerfectHashingFunction	

Semester			**III**		
CourseTitle	**OperatingSystems**				
CourseCode	**CMSACOR06T**	**Credit**	**4**		
CourseOutcome	Aftercompletion ofthecoursethe students will be able to: 1. To understand the services provided by and the design of anoperatingsystem. 2. To make aware of different types of Operating System and theirservices. 3. Tounderstandthestructureandorganizationofthefilesystem. 4. Tolearndifferentprocessschedulingalgorithmsandsynchronization techniquestoachievebetterperformanceofacomputersystem 5. Tounderstandwhataprocessisandhowprocessesaresynchronizedand scheduled. 6. Tounderstanddifferentapproachestomemorymanagement. 7. Toknowvirtualmemoryconcepts. 8. To learn secondarymemorymanagement.				
SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**BlendedMode(ICT+ DirectTeaching)**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**Introduction:** Basic OS functions, resource abstraction	2
1	Typesofoperatingsystems	3
1	Batchsystems	4

1	Multiprogrammingsystems,timesharingsystems	5

1	Operatingsystemsforpersonalcomputers&workstations	7
1	Processcontrol	9
1	Realtimesystems	10
2	**OperatingSystemOrganization:**Processorand usermodes	11
2	Kernels	13
2	SystemCalls	15
2	SystemPrograms	16
3	**ProcessManagement:**Systemview ofthe process and resources, process abstraction,processhierarchy	19
3	Threads,threadingissues	21
3	ThreadLibraries	23
3	ProcessScheduling,non-pre-emptive andpre-emptiveschedulingalgorithms	28
3	Concurrentandprocesses,Criticalsection	29
3	Semaphores,Methodsforinter-process communication	31
3	Deadlocks	35
	ClassTest	36
4	**MemoryManagement:**Physicalandvirtualaddressspace	37
4	Memoryallocationstrategies–fixedandvariable partitions	39
4	Paging	42
4	Segmentation	43
4	Virtual memory	45
	Seminar	46
5	**FileandI/OManagement**:Directorystructure	50

	Semester	**SEMESTERIII**	
CourseTitle	**ComputerNetworks**		
CourseCode	**CMSACOR07T**	**Credit**	**4**

CourseOutcome	AftercompletionoftheCoursethestudentswillbeableto, 1. **distinguish**betweendatacommunicationandc omputernetwork. 2. **learn**aboutdifferentlayersinOSIreferencemodeland TCP/IP protocolsuite. 3. **apply** various modulation, switching techniquesandtransmissionmediaused. 4. **understand** the services of datalink layer andprotocols. 5. **understand** multiple access protocol along withEthernet. 6. **learnabout** networklayerand**implement** differentroutingprotocols. 7. **apply** and **relate** the concept ofmultiplexing andde-multiplexingtechniques. 8. **learn** about transport leyer services and workingprinciples of UDP, TCP/IP protocols and congestióncontrolmechanisms. 9. **understand** the functionalities of application layerandapplicationlayerprotocols. 10. **apply**networkingknowledgeinreal-life environment.

SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**DirectTeachingwithICT**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**IntroductiontoComputerNetworks:**NetworkDefinition(Concepts, Real-lifeexamples Networkoperations,Graphrepresentation)	1
1	NetworkClassifications(LAN, MAN, WAN, PANetc.)	2
1	NetworkTopologies(Bus,Star,Ring,Tree,Mesh, Cubeetc.)	3
1	Network Protocol (Basic concepts, Service, Service vs. Protocol, Connection-less andConnection-orientedservice)	4
1	LayeredNetworkArchitecture(Significanceof layerednetwork,AbstractModel)	5
1	OSIReferenceModel(SevenLayerOSIModel, Rolesofeachlayers,protocolinvolves,serviceinvolvesetc.)	7
1	TCP/IPprotocolsuite(FiveLayerTCP/IPprotocol suite: Layer merging, description of eachlayer,protocolinvolves,comparisonwithOSI standard)	8
2	**DataCommunicationFundamentalsandTechniques:** Analog and Digital signal (Data vs.Information,Definition:Analogdata,Analog Signal,Digitaldataand DigitalSignal)	10
2	Data-rate Limits (Signal,Noise, Data rate, Bandwidth, Bit-rate,Baudrateetc.)	11
2	Pulse code modulation (Analog-to-DigitalConversion: Sampling, Quantization and Encoding)	12

2	DigitaltoDigitallineEncodingSchemes (LineCoding:Uni-polarEncoding,PolarEncoding:NRZschemes(NRZ-LandNRZ-I),RZ,Manchester,DifferentialManchester,Bipolar	14

	Encoding; BlockCodingetc.)	
2	ParallelandSerialTransmission(TransmissionModes:ParallelandSerialTransmissionSynchronous andAsynchronousSerialTransmission)	15
2	DigitaltoAnalogModulation(ASK,PSK,FSK, QPSK)	16
2	Multiplexingtechniques(FDM,TDM.WDM, CDMetc.)	17
2	Transmissionmedia(Unguidedmedia,Guided mediawith examples)	18
3	**NetworksSwitchingTechniquesandAccessMechanisms:**CircuitswitchingandPacketswitching (Phases of Circuit Switch Connection,AdvantagesandDisadvantagesofCircuitSwitching;AdvantagesandDisadvantagesofPacketSwitching,Differencesbetweentwo techniques).	20
3	Connectionlessdatagramswitching,Connection-orientedmechanism(Datagrampacketswitching,basicideaaboutIP,TCP, UDPetc.,handshaking).	22
3	VirtualCircuitSwitching(Definition,Exampleprotocols,AdvantagesandDisadvantagesofvirtualcircuitswitching;Featuresandphase,Switched virtual circuit, Permanent virtual circuit,Routingover virtual circuit).	24
3	Dial-upmodems;Digitalsubscriberline;CableTVfordatatransfer(Descriptionofeachsegment, workingprinciplesof eachtechnology,featuresandperformances).	27
3	**ClassTest**	28
4	**Data Link Layer Functions and Protocol :**ErrordetectionandErrorcorrectiontechniques(Detection:VRC,LRC,CRC,Checksum; Correction:Hammingcodeetc.)	31
4	DataLinkControl(LineDiscipline,ENQ/ACK;Poll/ Select;Flowcontrol:Stop&Wait,Sliding window).	33
4	ErrorRecoveryprotocols(StopandwaitARQ, go-back-nARQ)	35

4	PointtoPointProtocolon Internet(HDLC)	36

4	**Seminar**	38
5	**Multiple Access Protocol and Networks:** CSMA/CD protocols (Congestion, Collision,CSMA,CSMA/CD, CMSA/CA etc.)	40
5	Ethernet LANS(Persistent Strategies: 0-peorsisitent,1-persistentandp-persistent;IEEE 802.3(Ethernet),Thick net,Thin netetc.)	42
5	Connecting LAN and back-bone networks(Repeaters,Hubs,Switches,Bridges(Staticand Transparent),Routerand Gatewaysetc.)	43
6	**Networks Layer Functions and Protocols:** Routing(Networklayerbasic,Routingstrategies:Non-Adaptive andAdaptiveroutingstrategies).	44
6	Non-Adaptive Routing (Flooding, Damming, Selectiveflooding, Flow basedroutingetc.)	46
6	AdaptiveRouting(DistanceVectorrouting,Link state routing, Hierarchical Routing, Multi-destinationroutingetc.)	48
6	NetworkLayerprotocol(IP,IPV4,ICMP,IGMP etc.)	49
7	**TransportLayer Functions and Protocols:** Transport services (Error and Flow control,Process-to-Processdelivery)	50
7	Congestion control algorithm (Leaky bucketalgorithm,Token bucketalgorithm, chokespackets)	51
7	ConnectionorientedandConnectionlessprotocol(Connectionless protocol: UDP; connection-orientedprotocol:TCP, IPdatagram)	53
7	Connectionestablishmentandrelease(TCP/IP protocol working principle, three wayhandshakingetc.)	55
8	**OverviewofApplicationlayerprotocol:**DNS (Overview,Structure,domainsetc.)	57
8	WWWandHttp(Definition,Workingprinciple, Webpage,Web-Server,HTTPsecureetc.)	59
8	**InternalAssessment**	60

Semester	**SEMESTERIII**

CourseTitle	**ProgramminginPython**				
CourseCode	**CMSSSEC01M**	**Credit**	**2**		
CourseOutcome	Aftercompletionofthecoursethestudentswillbeableto, 1. **Acquireknowledgeandunderstanding**ofproblemsolvingusingaprogramminglanguage. 2. **Understand**thefundamentaltechniquesofprogram design like flowchart, decision table,algorithms. 3. **Understand**terms,symbols,concepts,principles,processesofprogramminginPython. 4. **Developskills**tosolveprogrammingassignments using Python language.				
SchemeofInstruction					
TotalDuration	15 weeks	**Class/Week**	2	**Hours/week**	2
InstructionMode	**DirectTeaching(withICT)+Practical**				
MaximumScore	25	**Internal**	25	**EndSemester**	0

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	Planning a Computer Program: Concept ofproblemsolving,Problemdefinition,Programdesign, Debugging, Types of errors inprogramming,Documentation.	2

2	TechniquesofProblemSolving:Flowchart, decision table, algorithms. Structuredprogrammingconcepts.Programming methodologies —top-down and bottom-upprogramming.	4
3	OverviewofProgramming:StructureofaPython Program,Elements of Python.	6
4	IntroductiontoPython:PythonInterpreter,UsingPythonascalculator,Pythonshell,Indentation. Atoms,Identifiersandkeywords,Literals,Strings,	8
4	Operators:variouscategory—Unary,binary, ternary.Pythonoperators:Arithmetic,Relational,Logical or Boolean, Assignment, Bit wise,IncrementorDecrementoperator.	10
5	CreatingPythonPrograms:InputandOutput Statements, Control statements: Branching,Looping	12
5	ConditionalStatements,Exitfunction.Difference between break, continue and pass. Functions,defaultarguments.	14
	ClassTest	15
	Studentseminar	18
	InternalAssessment	20

	Semester	**IV**	
CourseTitle	**DesignandAnalysisofAlgorithmsLab**		
CourseCode	**CMSACOR08T**	**Credit**	**4**

CourseOutcome	Aftercompletionofthecoursethestudentswillbeableto: 6.Writedifferenttypesofalgorithms(likeiterative,recursive)andpseudocodesandevaluatetheir

	performances. 7. Familiar with Existing algorithm design techniques likeIterative method, Greedy method, Divide and Conquer,DynamicProgramming. 8. Familiarwithexistingsortingandsearchingmethodand theirapplications. 9. Compare different sorting and searching techniques,their advantages, disadvantages, and computationalcomplexity. 10. Applyalgorithmdesigntechniquestosolvenew problemsand also find theircomplexity.. 11. Designnewalgorithmdesigntechniquesforsolving real worldproblems.

SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**BlendedMode(ICT+ DirectTeaching)**				

SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**Introduction:(5Lectures)** AlgorithmDefinitionandCharacteristics, Representations.Pseudocode, Iteration andRecursion.	2
1	Big"oh"(O),Omega(Ω),Thetanotation(Θ)	3

1	Analysis techniques of Algorithms(spaceand time complexity), Correctness ofAlgorithm.	4

2	**Algorithm Design Techniques: (8Lectures)** Basicconcept,Iterativetechniques, recursion	6
2	Introduction and Basic Method, BinarySearch,FindingMax.andMinelement, MergeSort.	7
2	BasicMethod,Multistagegraphs,Allpairsshortest path problem, Single-sourceshortestpath,LCS,Optimal Binarysearch trees,TheTravelingsalesmanproblem.	8
2	Basic Method, Knapsack Problem , Treevertex splitting Job sequencing with deadlines , Minimum-cost spanning trees ,Kruskal's algorithm, Optimal storage ontapesOptimalmergepattern,SingleSource ShortestPathProblem.	11
3	**Sorting and Searching Techniques : (20Lectures)** Bubble Sort, Insertion Sort, Selection sort,MergeSort,complexityanalysis	14
3	Medians&OrderStatistics	19

3	Sorting in Linear Time- Bucket Sort, RadixSortandCountSort,complexityanalysis.	21
3	SearchingTechniques-Linearsearch, Binarysearch,complexityanalysis.	26

3	Advanced Sorting techniques- Heap Sort,Quick Sort,complexityanalysis;	29
4	**LowerBoundingTechniques:(5 Lectures)** Decisióntrees	34
4	Decisiontreeofbubblesort,selectionsort, findingmaximumandminimumetc	36
	ClassTest	38
5	**BalancedTrees:(7Lectures)** Basicconceptoftree,Binarytree, Balancedtree.	39
5	Red-Blacktree,cerateared-black tree.	41
5	Insert,deleteandsearchanode fromRed-Black tree.	43
6	**Advanced Analysis Technique: (5Lectures)** Amortizedanalysis	46
6	Accountingmethod,Potentialmethod. Problemsolving.	48
	Seminar	50
7	**Graphs:(5 Lectures)** Concept of Graph, Breadth FirstSearch(BFS)anditsapplicat ion.	51
7	DepthFirst Search (DFS)andits Applications.	53
7	MinimumSpanningTrees, prim's Algorithm,Kruskal'sAlgorithm.	54
8	**StringProcessing:(5Lectures)** Stringmatchingproblem,NAIVEA lgorithm	56
8	KMPTechnique, Pattern matching, LSPTable, KMP Algorithm and itsapplications.	58

	InternalAssessment	60

Semester			**IV**		
CourseTitle	**SoftwareEngineeringTheory:60Lectures**				
CourseCode	**CMSACOR09T**	**Credit**	**4**		
CourseOutcome	Bysuccessfulcompletion,studentswillhavetheknowledgeandskills to: 1. Tolearnsoftwareengineeringlifecyclebydemonstratingcompetencein communication, planning, analysis, design, construction, anddeployment. 2. Studentsareabletoworkinoneormoresignificantapplicationdomains. 3. Students can work as an individual and as part of a multidisciplinaryteamtodevelopa qualitysoftware . 4. Studentscandemonstrateanabilitytousethetechniquesandtools necessaryfor engineeringpractice.				
SchemeofInstruction					
TotalDuration	60 lectures	**Class/Week**	4	**Hours/week**	4
InstructionMode	Face to face teaching process and also ICT based teaching-learningprocess.				
SchemeofExamination					
MaximumScore	50	**Internal**	8+2	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1.	**Introduction:**TheEvolvingRoleofSoftware,Software Characteristics, Changing Nature ofSoftware, Software Engineering as a LayeredTechnology, Software Process Framework,Framework and Umbrella Activities, ProcessModels, Capability Maturity Model Integration(CMMI).	**8Lectures**
2.	**Requirement Analysis Software:**Requirement Analysis, Initiating RequirementEngineering Process, Requirement Analysis andModelingTechniques,FlowOrientedModeling,Need for SRS, Characteristics and ComponentsofSRS.	10Lectures
3.	**Software Project Management :**EstimationinProjectPlanningProcess,Project Scheduling.	8Lectures
4.	**RiskManagement:**SoftwareRisks,RiskIdentification, Risk Projection and RiskRefinement,RMMM Plan.	8Lectures
5.	**Quality Management:** Quality Concepts,SoftwareQualityAssurance,Software Reviews,MetricsforProcess andProjects.	8Lectures

6.	**DesignEngineering:**DesignConcepts, ArchitecturalArchitecture,DataDesignatthe	10Lectures

	DesignElements,SoftwareArchitecturalLevela nd Component Level, Mapping of Data Flowinto Software Architecture, ModelingComponentLevel Design.	
7.	**TestingStrategies&Tactics:** Software Testing Fundamentals, StrategicApproach to Software Testing, Test Strategiesfor Conventional Software, Validation Testing,System testing, Black-Box Testing, White-BoxTestingandtheirtype,BasisPathTesting.	8Lectures

Semester		**SEMESTER IV**	
CourseTitle	**DatabaseManagementSystemsTheory**		
CourseCode	**CMSACOR10T**	**Credit**	**4**

CourseOutcome	Aftercompletionofthecoursethestudentswillbeableto, 1. **understand** thebasicconceptsandvariousdatamodelusedindatabasedesignE-Rmodellingconceptsand architectureuse. 2. **demonstrate**thelogicaldesignofthedatabasesystemsusingrelationaldatamodellingconceptsalong withdatabaseintegrityconstraints. 3. ***apply*** relational database theory and be ableto***describe***relationalalgebraexpression,tuple anddomainrelationexpressionfordesigningdatabasequeries. 4. ***understand*** *the* use of functional dependencies and**learn**toperformnormalizationprocesses,dependencypreservationruleslikeloss-lessandlossydecomposition,usedindatabasedesign. 5. ***apply***and***relate*** the concept of transaction,

	concurrencycontrol andrecoveryindatabase. 6.**gain**knowledgeoverphysicaldatabaseandindexingtechniqueusedinphysicaldatabasedesign.

SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**DirectTeachingwithICT**				

SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**Introduction:**Basicconcepts(Databasesystemintroduction,Applications,PurposeofDatabase Systemsetc.)	1
1	Characteristicsofdatabaseapproach(Viewof Data,DataAbstraction,InstancesandSchema)	2
1	Data models (Network, Object oriented, Relational,Distributed,Centralized,Multimedia,Hyperfileetc.)	4
1	Database system architecture and dataIndependence(Threetierarchitecture,Physical andlogicaldataindependencieswithexamples)	6
2	**EntityRelationship(ER):**Entitytypes(Entities-WeakandStrong,Attributes-Singlevalued,multivalued,multiple,composite,complex,inheritedetc.	8
2	Relationships(Cardinality,Mapping:one-to-one, one-to-many,many-to-oneandmany-to-many;Associationetc.)	10
2	Constraints (Domain constraints, Key constraints,Nullvalues,Entityintegrity:Key,Supperkey,Candidate key. Alternate key, Primary key etc.;Referentialintegrity(Foreignkey)andother usefuldatabaseconstraints.	12

2	ReallifeexamplesforE-Rmodellingperspective (componentsofE-Rmodelling,DesignE-Rdiagramfordifferentreal lifeperspective)	14

3	**RelationDataModel:**IntroductionandConcepts (Tupple,fieldsandrecordsetc.)	16
3	Relational model concepts (Concept Design,Relational Model Structure and Database Schema,KeysandSchemaDiagrams)	18
3	Relationalconstraints(TypesofconstraintsinRDBMS,RDBMS-DomainIntegrityConstraint, andReferential Integrity-etc.)	20
3	Relationalalgebra(Basicidea,RelationalQuery Languages,DifferentRelationalOperatorsetc.)	23
3	Relationalalgebra(Relationalcalculus,Tuplerelational Calculus and Domain relational calculus)	24
3	Relationalalgebra(solvingdifferentqueriesby usingrelationalalgebra)	26
3	SQLqueries(IntroductiontoDDL,DMl,DCL, TCLetc)	27
3	SQLqueries(AggregateFunctions,GROUPBY–HAVING,OrderBy, NestedSubqueriesetc.)	30
3	Join,Equi-join,thetajoin,divisionbasednested queriesetc.)	33
3	**ClassTest**	34
4	**Databasedesign:**Mapping(Cardinalityofdatabasewithexamples)	35
4	E-R/EE-RmodeltorelationaldatabaseE-RDesignIssues–ConceptDesign,ConceptualDesignforanyorganization,Practicewith different exampleE-R)	38
4	Functionaldependencies (Dependent,determinant, DefinitionofFD,FullFD,PartialFD.MutualFD,TransitiveFDetc.,Amstrong'saxiomsetc.)	40
4	Functional dependencies (closure finding algorithm,Identificationofkeys-candidatekeysand primarykeyetc.)	42
4	Normalforms(uptoBCNF)(anomaliesindatabasedesign,requirementofnormalization, differentnormalformslike1NF,2NF,3NFandBCNF with examples)	44
4	Normalization (Conversion of un-normalized	45

	DBMStonormalizedDBMS)	
4	Decomposition (decomposition preservationrules,losslessandlossydecomposition,lossless andlossydecompositiontesting rules)	47
4	**Seminar**	49

5	**Transaction Processing:**ACID properties(Transaction Concept, TransactionState-ImplementationofACID propertyetc.)	50
5	Concurrencycontrol(ConcurrentExecutions,Serializability,Recoverability,Testingforserializability,Lock–BasedProtocols,Timestamp BasedProtocols).	52
6	**FileStructureandIndexing:**Fileorganization (Orderedfile,Unorderedfile,Heap filesetc.)	54
6	SearchingtechniquesinFile(Indexing) (Primaryindex,secondaryindex,clusteringindexetc.;Sparseindexand dense index)	57
6	Multilevelindexing(Datastructuresof bothB-TreesandB+Tree,OperationsonB-TreeandB+ Tree-Insertion,Deletionofitems)	59
7	**InternalAssessment**	60

		Semester	**III**		
CourseTitle	**RProgramming**				
CourseCode	**CMSSSEC02M**	**Credit**	**2**		
CourseOutcome	**Uponcompletionofthis coursestudentswill beableto-** **1. ExplaincriticalRprogrammingconcepts** **2. Demonstratehow toinstalland configure RStudio** **3. ApplyOOPconceptsinRprogramming** **4. Explaintheuseofdatastructureandloopf unctions** **5. Analyse data and generate reports based on thedata** **6. ApplyvariousconceptstowriteprogramsinR**				
SchemeofInstruction					
TotalDuration	30	**Class/Week**	2	**Hours/week**	2
InstructionMode	InpersonteachingwithICTbasedteaching-learningprocedure				

SchemeofExamination					
MaximumScore	25	**Internal**	20+5	**EndSemester**	

CourseMapping		
Units	**CourseContent**	**LectureHour(Cumulative)**
1	Introduction Overview andHistoryof R,GettingHelp,Data Types,Subsetting,VectorizedOperations, Readingand WritingData	5
2	ControlStructures Decisionmaking: BranchingandLooping	10
3	Functions User-definedfunctions,lapply,tapply,split,mapply, apply	20
4	Codingstandards	25
5	Scopingrules, Debuggingtools, Simulation	30

Semester		**V**	
CourseTitle	**InternetTechnology**		
CourseCode	**CMSACOR11T**	**Credit**	**4**
CourseOutcome	1. Developproblem-solvingandprogrammingskillsusingOOPconcept 2. Developtheabilityto solve real-world problems usingJava 3. DevelopefficientJavaappletsandapplicationsusingOOPconcept.		
SchemeofInstruction			

TotalDuration	60 Hours	**Class/Week**	4	**Hours/week**	4

InstructionMode	DirectTeaching				
SchemeofExamination					
MaximumScore	50	Internal	10	EndSemester	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	Java:UseofObjects	2
1	Java: Array	3
2	Java:ArrayListclass	5
2	**JavaScript:** Datatypes,operators,	7
2	**JavaScript:** functions	9
2	**JavaScript:** controlstructures	11
2	**JavaScript:** events	13
2	**JavaScript:** events	15
2	**JavaScript:** event handling	17
2	**JavaScript:** event handling	19
3	JDBCFundamentals	21
3	EstablishingConnectivityandworkingwith connectioninterface,	23
3	Workingwith statements	25
3	CreatingandExecutingSQLStatements	27
3	WorkingwithResultSetObjects.	29
	ClassTest	30
4	JavaServerPages,	32
4	HTTPandServletBasics,TheProblemwith Servlets,	34
4	AnatomyofaJSPPage, JSPProcessing, JSP ApplicationDesignwithMVC,	36

4	ConditionalProcessing,DisplayingValues,Using anexpressionto SetanAttribute,	40
4	DeclaringVariablesand Methods,ErrorHandling andDebugging	42
4	SharingDataBetweenJSPPages,Requests,and Users	44
4	DatabaseAccess	46
	StudentSeminar	49
5	JavaBeans Fundamentals,	51
5	JAR files,	53
5	Developingasimple Bean	55
5	Connectingto DB	57
	InternalAssessment	60

	Semester	**V**			
CourseTitle	**TheoryofComputations**				
CourseCode	**CMSACOR12T**	**Credit**	**6**		
CourseOutcome	Aftercompletion ofthecoursethe studentswill be able to: 1. Understandtheequivalencenondeterministicfiniteautomataand deterministicfinite automata. 2. Understandtheequivalencebetweencontextfreegrammarsand non-deterministicpush down automata. 3. AppreciatethepoweroftheTuringmachineasanabstractautomatonthatdescribescomputationeffectivelyandefficiently. 4. Toidentifytheun-decidable problem				
SchemeofInstruction					
TotalDuration	75	**Class/Week**	6	**Hours/week**	6
InstructionMode	**BlendedMode(ICT+DirectTeaching)**				
SchemeofExamination					
MaximumScore	75	**Internal**	25	**EndSemester**	50
CourseMapping					

Units	CourseContent	LectureHour(Cumulative)

1	**Languages**:Alphabets,string,language	2
1	BasicOperationsonlanguage	5
1	Concatenation	7
1	KleeneStar	10
2	**FiniteAutomataandRegularLanguages**: RegularExpressions(withArden'sTheorem)	16
2	TransitionGraphs,	17
2	Deterministicandnon-deterministicfinite automata	21
2	NFAto DFA Conversion, (with MealyMoore Machines)	26
2	Regularlanguagesandtheirrelationshipwith finiteautomata	27
2	Pumpinglemma	29
2	Closurepropertiesofregularlanguages	30
2	Tutorial	35
3	**Contextfreelanguages:**Contextfreegrammars	36
3	Parsetrees	38
3	Ambiguitiesingrammarsandlanguages	39
3	Propertiesofcontextfree languages	42
3	Normalforms(CNFandGreibach NF)	44
3	PumpingLemma	46
3	Pushdownautomata(Deterministic andNon-deterministic)	50
3	Tutorial	55
	ClassTest	56
4	**TuringMachinesandModelsof Computations:** RAM	57
4	TuringMachineasamodelofcomputation	60
4	UniversalTuringMachine	61

4	Languageacceptability	62
4	Decidability	64
4	Haltingproblem	65
4	Recursivelyenumerable andrecursivelanguages	67
4	Un solvabilityproblems	69
4	Tutorial	74
	InternalAssessment	75

	Semester	**V**	
CourseTitle	**MicroprocessorTheory:60Lectures**		
CourseCode	**CSMADSE01T**	**Credit**	**4**
CourseOutcome	Atthecompletion ofthecourse,students willbeableto 1. Describethearchitecturesof8085and8086microprocessor s.andto draw timingdiagrams. 2. Writeassemblylanguageprogramsusing8085and 8086. 3. Distinguish between the different modules of operation ofmicroprocessors. 4. Interfaceperipheralsto8085and8086. 5. Evaluatetheappropriatenessofamemoryexpansioninterfac ebasedonthe addressreference with particularapplication. 6. Applytheaboveconceptsto real worldelectricaland		

	electronicsproblemsandapplications.				
SchemeofInstruction					
TotalDuration	60 Lectures	**Class/Week**	4	**Hours/week**	4
InstructionMode	Face to face teaching process and also ICT based teaching-learningprocess.				
SchemeofExamination					
MaximumScore	50	**Internal**	8+2	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1.	**Microprocessor architecture:** Internalarchitecture, system bus architecture, memoryandI/O interfaces. .	20Lectures
2.	**Microprocessorprogramming:**RegisterOrganization, instruction formats, assemblylanguageprogramming.	20Lectures
3.	**Interfacing:**Memoryaddressdecoding,cache memory and cache controllers, I/O interface,keyboard, display, timer, interrupt controller,DMAcontroller, videocontrollers,communicationinterfaces.	20Lectures

Semester					
CourseTitle	**DataMining**				
CourseCode	**CSMADSE02T**	**Credit**	**4**		
CourseOutcome	Afterundergoingthecourse,Studentswill beabletounderstand: - Extractknowledgeusingdataminingtechniques - Adapttonewdataminingtools. - Explaintheanalyzingtechniquesofvariousdataminingtasks. - Comparedifferentapproachesofdataminingtechnologies.				
SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**BothonlineandOffline**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1.	**Overview**	
	Predictivedataminingtechniques	4(4)
	descriptivedataminingtechniques	4(8)
	supervisedlearningtechniques	5 (13)
	Unsupervisedlearningtechniques	5 (18)
	processofknowledgediscoveryindatabases	4 (22)
	pre-processingmethods	3 (25)
2.	**DataMiningTechniques**	
	AssociationRuleMining	5 (30)
	classificationtechniques	6 (36)
	Regressiontechniques	6 (42)

	clustering	5 (47)

	Scalability	4 (51)
	datamanagementissuesindataminingalgorithms	5 (56)
	measuresofinterestingness	4 (60)

		Semester			
CourseTitle	**ArtificialIntelligence**				
CourseCode	**CMSACOR13T**	**Credit**	**4**		
CourseOutcome	OnsuccessfulcompletionofthiscoursestudentswillbeableTo: - DefinetheconceptofArtificialIntelligence. - applyArtificialIntelligencetechniquesforproblemsolving. - Evaluate the advantages, disadvantages, challenges, andramificationsof human–AIaugmentation.				
SchemeofInstruction					
TotalDuration	60	**Class/Week**	4	**Hours/week**	4
InstructionMode	**BothonlineandOffline**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40

CourseMapping		
Units	**CourseContent**	**LectureHour(Cumulative)**
1	**Introduction**	
	IntroductiontoArtificialIntelligence	1(1)
	BackgroundandApplications	1(2)
	TuringTest andRationalAgentapproachesto AI	1(3)
	IntroductiontoIntelligentAgents,	1(4)

	Structure,behaviorandenvironmentof Intelligentagent	2(6)

2.	**ProblemSolving andSearching Techniques**	
	ProblemCharacteristicsandProductionSystems	1(7)
	ControlStrategies	1(8)
	BreadthFirstSearch	1(9)
	DepthFirst Search	1 (10)
	HillclimbinganditsVariations	3 (13)
	HeuristicsSearchTechniques:BestFirstSearch	2 (15)
	A*algorithm	3 (18)
	ConstraintSatisfactionProblem	2 (20)
	Means-EndAnalysis	2 (22)
	IntroductiontoGamePlaying	1 (23)
	Min-MaxandAlpha-Betapruningalgorithms.	3 (26)
3.	**KnowledgeRepresentation**	
	IntroductiontoFirstOrderPredicateLogic	4 (30)
	ResolutionPrinciple	3 (33)
	Unification	2 (35)
	SemanticNets	2 (37)
	ConceptualDependencies	2 (39)
	Frames	1(40)
	andScripts	1 (41)
	ProductionRules	1 (42)
	ConceptualGraphs	2 (44)
	ProgramminginLogic(PROLOG)	2 (46)

4.	**DealingwithUncertaintyand Inconsistencies**	
	TruthMaintenanceSystem	1 (47)
	DefaultReasoning	2 (49)
	ProbabilisticReasoning	2 (51)
	BayesianProbabilisticInference	2 (53)
	PossibleWorldRepresentations.	1 (54)
5.	**UnderstandingNaturalLanguages**	
	ParsingTechniques	2 (56)
	Context-FreeandTransformationalGrammars	2 (58)
	RecursiveandAugmentedTransitionNets.	2 (60)

	Semester	**V**	
CourseTitle	**ComputerGraphics**		
CourseCode	**CMSACOR14T**	**Credit**	**4**
CourseOutcome	**Aftercompletion of thecoursethestudentswillbeableto** 1. Understandthebasicsofcomputergraphics,differentgraphicssystemsandapplications ofcomputergraphics. 2. Discussvariousalgorithmsfor scanconversionandfilling ofbasicobjects and theircomparativeanalysis. 3. Useofgeometrictransformationsongraphicsobjectsandtheirapplicationin composite form. 4. Extract scene with different clipping methods and itstransformationtographics displaydevice. 5. Exploreprojectionsandvisiblesurfacedetectiontechniquesfor displayof 3Dsceneon2D screen. 6. Renderprojectedobjectstonaturalizethescenein2Dviewand		

	useof illumination modelsforthis.				
SchemeofInstruction					
TotalDuration	60 Lectures	**Class/Week**	4	**Hours/week**	4
InstructionMode	InpersonteachingwithICTbasedteaching-learningprocedure				
SchemeofExamination					
MaximumScore	50	**Internal**	8+2 (Theo)	**EndSemester**	40

CourseMapping

Units	CourseContent	LectureHour(Cumulative)
1	**Introduction(5Lectures)**	
	BasicelementsofComputergraphics	1
	ApplicationsofComputerGraphics	3
	ApplicationsofComputerGraphics	5
2	**GraphicsHardware**	
	ArchitectureofRasterscandisplaydevices.	6
	ArchitectureofRandomscandisplaydevices	8
	I/ODevices	10
	I/ODevices	12
3	**FundamentalTechniquesinGraphics**	
	DDAlinedrawing,Bresenham’slinedrawing,Midpointlinedrawing	13
	Bresenham’scircledrawing,Midpointcircle drawing	17
	Bresenham’sellipsedrawing	21
	Polygon filling:FloodfillandBoundaryfillapproach.	23

	Lineclippingalgorithm:Cohen-Sutherland's algorithm,Midpointsub-divisionbased	25

	algorithm, Polygonclipping:Sutherland-Hodgemanalgorithm	
	2D Transformation: Translation, Rotation,Scaling,Reflection, Shrearing	29
	Overview of 3D transformations: Translation,Rotation,Scaling,Reflection, Shrearing	33
	BasicIdeaofProjection, OverviewofParallelandPerspective	34
4	**GeometricModeling**	
	Overview: Explicit, implicit, and parametriccurves.	35
	Beziercurve	37
	B-Spline	39
	B-Splineapplication	40
	Polygonsurfaces	42
5	**VisibleSurfacedetermination**	
	Z– buffer method	44
	Scanlinemethod	46
	Areasubdivisiónmethod	48
	Backfasedetection	50
6	**Surfacerendering**	
	IlluminationandShadingmodel	52
	Basiccolormodels	54
	ComputerAnimation:overviewI	56
	ComputerAnimation:overviewII	58
	Summaryof the course	60

Semester	**SEMESTERVI**				
CourseTitle	**DigitalImageProcessing**				
CourseCode	**CMSADSE05T**	**Credit**	**4**		
CourseOutcome	After completion of the Course the students will be ableto, 1. **Acquire knowledge and understanding** of theconcepts, principles, processes, application fieldsetc.of DigitalImageProcessing. 2. **Identifyandformulate**appropriateDIPtechniqueto solvearelevantproblem. 3. **Compare** different techniques in respect ofadvantages, disadvantages, and computationalcomplexity. 4. **Implement**commonalgorithmsforDIP. 5. **Apply** the theoretical knowledge in real-life digitalimagingapplications.				
SchemeofInstruction					
TotalDuration	15 weeks	**Class/Week**	4	**Hours/week**	4
InstructionMode	**DirectTeaching(withICT)**				
SchemeofExamination					
MaximumScore	50	**Internal**	10	**EndSemester**	40
CourseMapping					
Units	**CourseContent**			**LectureHour(Cumulative)**	

1	Digital Image Processing: Introduction, imageacquisition, imaging sensors. Human eye, visualperceptions,opticalillusions,contrastsensitivity,brightnessadaption anddiscrimination.	2
1	Digitizing an image: sampling and quantization.Pixel:thebasicunitofadigitalimage,coordinateconventions for a 2D image. Resolution: pixeldimensionversus physicaldimension.	4
1	Typesofimages:binary,grayscaleandcolor images. Neighboursofa pixel.Adjacencyandconnectivity of pixels; region and boundary.Imaginggeometry,perspectiveProjection.	6
2	Point processing: Intensity transformations,basicconcepts,negativetransformation,logandpower-law(gamma) transformation.	7
2	Contraststretching,Piecewiselinear transformation.Histogramequalization:algorithmandillustrations.	9
2	Neighborhood processing: basic concepts,Correlation and convolution, sliding windowapproach.	11
2	Spatial Domain Filters: Smoothing filters, Sharpeningfilters; Imagegradients; Image Laplacian.	13
3	Filtering in the Frequency domain: Basic concepts—spatial domain versus frequency domain filtering.Fourierseries,FourierTransformanditsproperties.	16

3	FastFourierTransform,DecimationinFrequencyand DecimationinTime.	18
3	Frequency domain operations: Correlation andConvolution, 2-D sampling, Discrete CosineTransform.HotellingTransform.	21
	ClassTest	22

7	MorphologicalImageProcessing:Basicconcepts—Settheoreticoperationsonimages,Structuringelement(SE).Erosion,Dilation,Opening,Closing,Hit-or-MissTransform.	48
7	Advanced topics: Boundary Detection, Holefilling,Connectedcomponents,Convex hull.	50
7	Thinning, thickening, skeletons, pruning, GeodesicDilation,Erosion,Reconstructionbydilationand erosion.	52
8	Image Segmentation: Basic concepts — Changedetectioninimages.Point,line,edgedetection.	54
8	Segmentation techniques: Local processing, regionalprocessing,Hough transform.	56
8	Thresholding,Iterativethresholding,Otsu'smethod,Movingaverages,Multivariablethresholding.	58
8	Region-basedsegmentation,Watershedalgorithm,Useofmotionin segmentation.	59
	InternalAssessment	60