Semester-III

High-PerformanceComputing			
Course Code	22SAM31	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:2	SEEMarks	50
TotalHoursofPedagogy	50	TotalMarks	100
Credits	04	ExamHours	03

CourseLearningobjectives:

- Explorethedesign,analysis,andimplementation,ofhighperformance computationalscienceandengineeringapplications.
- Illustrateadvancedcomputerarchitectures,parallelalgorithms,parallel languages,and performance-orientedcomputing.

Module-1

Introduction to Parallel Computing: Motivating Parallelism, Scope of Parallel Computing, ParallelProgramming Platforms: Implicit Parallelism: Trends in Microprocessor Architectures, LimitationsofMemorySystemPerformance,DichotomyofParallelComputingPlatforms,PhysicalOrganizationofParallelPlatforms,CommunicationCostsinParallelMachines,RoutingMechanismsforInterconnectionNetworks,ImpactofProcess-ProcessorMappingandMapping Techniques.

Teaching-LearningProcess	Chalkand board,PPT

Module-2

Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, CharacteristicsofTasksandInteractions,MappingTechniquesforLoadBalancing,MethodsforContaining Interaction Overheads, Parallel Algorithm Models Basic Communication Operations: One-to-AllBroadcast and All-to-One Reduction, Allto-All Broadcast and Reduction, All-Reduce and Prefix-SumOperations,ScatterandGather,All-to-AllPersonalizedCommunication,CircularShift,Improvingthe Speed ofSome Communication Operations

Teaching-LearningProcess	Chalkand board,PPT

Module-3

Analytical Modeling of Parallel Programs: Sources of Overhead in Parallel Programs, PerformanceMetrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of ParallelSystems. MinimumExecution Time and MinimumCost-Optimal Execution Time, AsymptoticAnalysisof ParallelProgramsSection5.7.Other Scalability Metrics,ProgrammingUsing theMessage-Passing Paradigm: Principles of Message-Passing Programming, The Building Blocks:Send and Receive Operations, MPI: the Message Passing Interface, Topologies and Embedding,OverlappingCommunicationwithComputation,CollectiveCommunicationandComputation Operations,Groups and Communicators

Teaching-Learning Process	Chalkand board,PPT

Module-4

Programming Shared Address Space Platforms: Thread Basics, Why Threads?, The POSIX ThreadAPI, Thread Basics: Creation and Termination, Synchronization Primitives in Pthreads, ControllingThreadandSynchronizationAttributes,ThreadCancellation,08CompositeSynchronization Constructs,TipsforDesigningAsynchronousPrograms,OpenMP:aStandardforDirectiveBased

	ParallelProgrammingDenseMatrixAlgorithms:Matrix-VectorMultiplication,Matrix-MatrixMultiplication,SolvingaSystemofLinearEquationsSorting:IssuesinSortingonParallel Computers,SortingNetworks,BubbleSort anditsVariants,Quicksort,BucketandSampleSort.
Teaching-LearningProcess	Chalkand board,PPT

Module-5
Graph Algorithms: Definitions and Representation, Minimum Spanning Tree: Prim's Algorithm,Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Paths, Transitive Closure,ConnectedComponents,AlgorithmsforSparseGraphs,SearchAlgorithmsforDiscreteOptimization Problems: Definitions and Examples, Sequential Search Algorithms, Search OverheadFactor,ParallelDepth-FirstSearch,ParallelBest-FirstSearch,Speedup,AnomaliesinParallel SearchAlgorithms

Teaching-LearningProcess	Chalkand board,PPT

AssessmentDetails (both CIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination) takentogether.

ContinuousInternalEvaluation:

- ThreeUnitTestseachof **20 Marks**
- Twoassignmentseachof **20Marks** or **oneSkillDevelopmentActivityof40marks**
  toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities,willbe **scaleddownto50marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBloom'staxonomyaspertheoutcomedefinedfor the course.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreduced to50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswer fivefullquestions,selectingonefullquestionfromeachmodule

SuggestedLearningResources:

TextBooks:

1.IntroductiontoParallelComputing,AnanthGrama,AnshulGupta,GeorgeKarypis,andVipinKumar,2ndedition, Addison-Welsey, 2003.

ReferenceBooks:

1. Grama,A.Gupta,G.Karypis,V.Kumar,AnIntroductiontoParallelComputing,DesignandAnalysisofAlgorithms: 2/e, Addison-Wesley, 2003.

2. G.E.Karniadakis,R.M.KirbyII,ParallelScientificComputinginC++andMPI:ASeamlessApproachto Parallel Algorithmsand theirImplementation,CambridgeUniversityPress,2003.

WeblinksandVideo Lectures(e-Resources):

- https://www.youtube.com/watch?v=1jYOBr-orpk&list=PL2F82ECDF8BB71B0C

SkillDevelopmentActivitiesSuggested

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.Thepreparedreportshall be evaluated for CIEmark.

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	IllustratethekeyfactorsaffectingtheperformanceofCSEapplications	L1
CO2	Illustratemappingofapplicationstohigh-performance computingsystems	
	L2CO3 Applyhardware/softwareco-designforachievingperformanceonreal-worldapplications	L3

ProgramOutcomeofthiscourse

Sl.No.	Description	POs

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	x		x		x					
CO2		x							x	
CO3	x	x	x				x			x

SoftandEvolutionaryComputing			
CourseCode	22SAM321	**CIEMarks**	50
TeachingHours/Week(L:P:SDA)	3:0:0	**SEEMarks**	50
TotalHoursofPedagogy	40	**TotalMarks**	100
Credits	03	**ExamHours**	03

CourseLearningobjectives:
- Tolearntoimplementmachinelearningalgorithms.
- Learntousegeneticalgorithmstosolveoptimizationproblems.
- Learnandimplementfuzzysystems.

Module-1	
Introduction to Softcomputing:Neuralnetworks,Fuzzy logic, Geneticalgorithms,Hybridsystemsanditsapplications.Introductionto classicalsetsand fuzzysets:Classicalrelationsand fuzzyrelations,Membership functions.	
Teaching-Learning Process	Chalkand Talk/PPT

Module-2	
Defuzzification,Fuzzydecisionmaking,andapplications.	
Teaching-LearningProcess	Chalkand Talk/PPT

Module-3	
Geneticalgorithms:Introduction,Basicoperations, Traditionalalgorithms,SimpleGAGeneralgeneticalgorithms,Theschematheorem, Genetic programming, applications.	
Teaching-Learning Process	Chalkand Talk/PPT

Module-4	
SwarmIntelligenceSystem:Introduction,backgroundofSI,AntcolonysystemWorkingofantcolonyoptimization,antcolonyfor TSP.	
Teaching-Learning Process	Chalkand Talk/PPT

Module-5	
Unitcommitmentproblem,particleSwarmIntelligence systemArtificialbeecolonysystem,Cuckoosearchsystem.	
Teaching-Learning Process	Chalkand Talk/PPT

AssessmentDetails(bothCIEandSEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination)takentogether.

ContinuousInternalEvaluation:

- ThreeUnitTestseachof20 Marks
- Twoassignmentseachof20MarksoroneSkillDevelopment Activityof40marks
- toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities, willbescaleddownto50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined forthecourse.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreducedto50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfull questionisfor20marks. Therewillbetwofull questions (withamaximumoffoursub-questions)fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswer fivefullquestions,selectingonefullquestionfromeachmodule

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SuggestedLearningResources:

Books

1. Principlesof Soft computingShivanandam,DeepaS.NWileyIndia2011
2. Soft ComputingwithMATLABProgrammingN. P.PadhyS.P.Simon Oxford2015

WeblinksandVideoLectures(e-Resources):

- https://www.youtube.com/watch?v=K9gjuXjJeEM&list=PLJ5C_6qdAvBFqAYS0P9INAogIMklG8E-9

SkillDevelopmentActivitiesSuggested

Thestudents withthehelpofthecourseteachercantakeup relevanttechnicalactivities whichwillenhancetheirskill.Thepreparedreportshall be evaluatedfor CIEmarks.

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	Implementmachinelearningthroughneuralnetworks.	L2
CO2	DesignGeneticAlgorithmtosolvetheoptimizationproblem.	L3
CO3	Developa Fuzzyexpert system	L3

Mappingof COsand POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X					X					x	
CO2		X	X									x
CO3			X		X							

Semester-III

DecisionSupportSystem			
Course Code	22SAM322	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:
- Recognizetherelationshipbetweenbusinessinformationneedsanddecisionmaking
- Appraisethegeneralnatureandrangeofdecisionsupportsystems
- AppraiseissuesrelatedtothedevelopmentofDSS
- Selectappropriatemodelingtechniques
- Analyze,designandimplementaDSS

Module-1
Introduction to decision support systems: DSS Defined, History of decision support systems, Ingredients of a DSS, Dataand model management, DSS Knowledge base, User interfaces, User interfaces, The DSS user, Categories and classesof DSSs, Chapter Summary. Decisions and decision makers Decision makers: who are they, Decision styles, Decisioneffectiveness,HowcanaDSShelp?,ATypologyofdecisions,Decisiontheory andsimon'smodelofproblem solving, Bounded decision making, The process of choice, Cognitive processes, Biases and heuristics in decision making,Chapter summary.

Teaching-LearningProcess	Chalkandtalk/PPT/casestudy/webcontent

Module-2
Decisions in the organization: Understanding the organization, Organizational culture. Modelling decision processes:Definingtheproblemanditsstructures,Decisionmodels,Typesofprobability,Techniquesforforecastingprobabilities,Calibrationandsensitivity,Chaptersummary

Teaching-LearningProcess	Chalkandtalk/PPT/casestudy/webcontent

Module-3
Group decision support and groupware technologies: Group Decision making, the problem with groups, MDM supporttechnologies,ManagingMDMactivities,thevirtualworkspace,chaptersummary.Executiveinformationsystems:What exactly is an EIS, Some EIS history, Why area top executives so different?, EIS components, Making the EISwork,The future ofexecutivedecisionmakingandthe EIS,chaptersummary

Teaching-LearningProcess	Chalkandtalk/PPT/casestudy/webcontent

Module-4
Designing and building decision support systems: Strategies for DSS analysis and design, The DSS developer, DSS userinterface issues, chapter summary. Implementing and integrating decision support systems: DSS implementation, Systemevaluation,The importance of integration,chaptersummary.

Teaching-LearningProcess	Chalkandtalk/PPT/casestudy/webcontent

Module-5
CreativedecisionmakingandproblemsolvingWhatiscreativity?,Creativitydefined,Theoccurrenceofcreativity,Creativeproblemsolvingtechniques,Creativityand the roleoftechnology,chapter summary.

Teaching-LearningProcess	Chalkandtalk/PPT/casestudy/webcontent

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination) takentogether.

ContinuousInternalEvaluation:
- ThreeUnitTestseachof **20 Marks**
- Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivityof40marks** toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBloom'staxonomyaspertheoutcomedefinedfor the course.

SemesterEndExamination:
- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreducedto50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfull questionisfor 20marks.Therewillbetwo full questions (withamaximumoffoursub-questions) fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswer fivefullquestions,selectingonefullquestionfromeachmodule

SuggestedLearningResources:

TextBooks
1. Decisionsupportsystem.GeorgeM.Marakas.PHI,2011.

ReferenceBooks:
2. DecisionSupportSystems,Marakas.2NdEdn,PearsonIndia,2015.

WeblinksandVideo Lectures(e-Resources):
- https://www.coursera.org/lecture/business-intelligence-tools/decision-support-systems-video-lecture-E8P9x

SkillDevelopmentActivitiesSuggested

Thestudentswiththehelpofthecourseteachercantakeuprelevanttechnical–
activitieswhichwillenhancetheirskill.Thepreparedreportshall be evaluated for CIEmarks.

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	AppraiseissuesrelatedtothedevelopmentofDSS	L1
CO2	Selectappropriatemodelingtechniques	L1
CO3	Analyze,designandimplementaDSS	L2

ProgramOutcomeofthiscourse

Sl.No.	Description	POs
1	Engineeringknowledge:Applytheknowledgeofmathematics,science,engineering fundamentals,andcomputerscienceandbusinesssystemstothesolutionofcomplexengineeringandsocietalproblems.	Po1
2	Problemanalysis:Identify,formulate,reviewresearchliterature,andanalyzecomplexengineeringandbusinessproblemsreachingsubstantiatedconclusionsusingfirst principlesofmathematics,naturalsciences,andengineeringsciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriateconsiderationforthepublichealthandsafety,andthecultural,societal,and environmentalconsiderations.	PO3
4	Conductinvestigations of complexproblems:Useresearch-basedknowledgeandresearch methodsincludingdesignofexperiments,analysisandinterpretationofdata,andsynthesisoftheinformationtoprovidevalidconclusions.	PO4
5	Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengineeringandITtoolsincludingpredictionandmodelingtocomplex engineeringactivitieswithanunderstandingofthelimitations	PO5
6	Theengineerandsociety:Applyreasoninginformedbythecontextualknowledgeto assesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessional engineeringand businesspractices.	PO6
7	Environmentandsustainability:Understandtheimpactoftheprofessionalengineeringsolutions in businesssocietaland environmentalcontexts,and demonstratetheknowledge of,andneedforsustainabledevelopment.	PO7
8	Ethics:Applyethical principles andcommit toprofessionalethics andresponsibilitiesand normsoftheengineeringandbusinesspractices.	PO8
9	Individualandteamwork:Functioneffectivelyasanindividual,andasamemberor leaderindiverseteams,andin multidisciplinarysettings.	PO9
10	Communication:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunityandwithsocietyatlarge,suchas,beingabletocomprehendand writeeffectivereportsanddesigndocumentation,makeeffectivepresentations,andgiveand receive clear instructions.	PO10
11	Projectmanagementandfinance:Demonstrateknowledgeandunderstandingoftheengineering,businessandmanagementprinciplesandapplythesetoone'sownwork,asa memberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments.	PO11
12	Life-longlearning:Recognizetheneedfor, andhavethepreparationandabilityto engageinindependentand life-longlearninginthebroadestcontextoftechnologicalchange.	PO12

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x	x										
CO2				x						x		
CO3		x			x							

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Semester-III

SpeechProcessing			
Course Code	22SAM323	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:
- Explorethefundamentals ofspeechprocessing
- Explorethelinearpredictive coding
- Exploretheapplicationsofspeechprocessing

Module-1	
Introduction,FundamentalsofDigitalSpeechProcessing	
Teaching-Learning Process	Chalkand board,PPT

Module-2	
Digitalmodelsforthespeechsignals,Time domainmodelsforspeechprocessing	
Teaching-LearningProcess	Chalkand board,PPT

Module-3	
Digitalrepresentationof thespeechwaveform,shorttermFourieranalysis	
Teaching-LearningProcess	Chalkand board,PPT

Module-4	
Homomorphic speech processing, Linear predictive coding of speech: Introduction, Basic principlesof LP analyse, Computation of gain for the model, solution of LPC equation, Comparison betweenthemethods ofsolution ofthe LPC analysis equation,the predictionerrorsignal.	
Teaching-LearningProcess	Chalkand board,PPT

Module-5	
Linearpredictivecodingofspeech:FrequencydomaininterpretationofLPanalysis,RelationofLPanalysis, Relationsbetweenvariousspeechparameters,applicationsDigitalspeechforman machinecommunicationbyvoice	
Teaching-LearningProcess	Chalkand board,PPT

AssessmentDetails (bothCIE andSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination) takentogether.

ContinuousInternalEvaluation:

- ThreeUnitTestseachof **20 Marks**
- Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivityof40marks**
  toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities, willbe**scaleddownto50marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBloom'staxonomyaspertheoutcomedefinedfor the course.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreduced to50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfull questionisfor 20marks.Therewillbetwo full questions(withamaximumof foursub-questions) fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswer fivefullquestions,selectingonefullquestionfromeachmodule

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SuggestedLearningResources:

TextBooks:

1.DigitalProcessingof SpeechSignalsLawrenceR.Rabiner,RonaldW.SchaferPearson

ReferenceBooks:

1. Speechand Audio SignalProcessingPaperback, A.R. JAYANPHI
2. SpeechandAudioProcessingApteShaila DWileyIndiaPvt.Ltd

WeblinksandVideo Lectures(e-Resources):

- https://www.youtube.com/watch?v=EMmckCO9QhA&list=PLvv3PyiCcNrFuT7CEIvIr4a4g4orascx3

SkillDevelopmentActivitiesSuggested

Thestudents withthehelpofthecourseteachercantakeup relevanttechnical–
activitieswhichwillenhancetheirskill.Thepreparedreportshall be evaluated for CIEmarks.

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	Explainthefundamentalsofspeechprocessing	L1
CO2	Summarizethemodelsof speechprocessing	L1
CO3	Inferthelinearpredictivecoding	L2
CO4	Illustratetheapplication ofspeechprocessing	L3

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	x		x		x					
CO2		x							x	
CO3	x	x	x				x			x
CO4				x						

Semester-III

Internet of Things and Applications				
Course Code	22SAM324	CIEMarks	50	
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50	
TotalHoursofPedagogy	40	TotalMarks	100	
Credits	03	ExamHours	03	

CourseLearningobjectives:

- Learntodevelopschemesfortheapplicationsof IOTinrealtimescenarios
- LearntomanagetheInternetresources
- ExplorethemodelsofInternetofthingstobusiness
- Deploythepracticalknowledgethroughdifferentcasestudies

Module-1
WhatisTheInternetofThings?OverviewandMotivations,ExamplesofApplications,IPV6Role,AreasofDevelopment and Standardization, Scope of the Present Investigation. Internet of Things Definitions and frameworks-IoT Definitions, IoT Frameworks, Basic Nodal Capabilities. Internet of Things Application Examples-Overview, SmartMetering/Advanced Metering Infrastructure-Health/Body Area Networks, City Automation, Automotive Applications,HomeAutomation,SmartCards,Tracking,OverThe-Air-PassiveSurveillance/RingofSteel,ControlApplication Examples,MyriadOtherApplications.

Teaching-Learning Process	Chalkand board,PPT

Module-2
FundamentalIoTMechanismandKeyTechnologies-IdentificationofIoTObjectandServices,StructuralAspectsofthe IoT, Key IoT Technologies. Evolving IoT Standards-Overview and Approaches, IETF IPV6 Routing Protocol forRPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation PartnershipProject Service Requirements for Machine-Type Communications, CENELEC, IETF Ipv6 Over Low power WPAN,ZigbeeIP(ZIP),IPSO

Teaching-LearningProcess	Chalkand board,PPT

Module-3
Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and MobileNetwork Technologies for IoT/M2M,Layer 3 Connectivity:Ipv6 Technologies for the IoT: Overview and Motivations.Address Capabilities,Ipv6 Protocol Overview, Ipv6 Tunnelling, Ipsec in Ipv6,Header Compression Schemes, Quality ofServiceinIpv6, MigrationStrategiestoIpv6.

Teaching-LearningProcess	Chalkand board,PPT

Module-4
CaseStudiesillustratingIoTDesign-Introduction,HomeAutomation,Cities,Environment,Agriculture,ProductivityApplications.

Teaching-LearningProcess	Chalkand board,PPT

Module-5
DataAnalyticsforIoT–Introduction,ApacheHadoop,UsingHadoopMapReduceforBatchDataAnalysis,Apache Oozie,ApacheSpark,ApacheStorm,UsingApacheStormforReal-timeDataAnalysis,StructuralHealthMonitoringCaseStudy.

Teaching-Learning Process	Chalkand board,PPT

AssessmentDetails (bothCIE andSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination) takentogether.

ContinuousInternalEvaluation:

- ThreeUnitTestseachof **20 Marks**
- Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivityof40marks** toattaintheCOsandPOs

Thesumofthree tests,twoassignments/skillDevelopmentActivities, willbe**scaleddownto50marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBloom'staxonomyaspertheoutcomedefinedfor the course.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreduced to50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfull questionisfor 20marks.Therewillbetwo full questions (withamaximumoffoursub-questions) fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswerfivefullquestions,selectingonefullquestionfromeachmodule
-

SuggestedLearningResources:

TextBooks:

1. BuildingtheInternetofThingswithIpv6andMIPv6:TheEvolvingWorldofM2MCommunicationsDanielMinoliWiley2013
2. InternetofThings: AHands-onApproachArshdeepBahga,VijayMadisettiUniversities Press2015

ReferenceBooks:

1. TheInternetofThingsMichaelMillerPearson2015 FirstEdition
2. DesigningConnectedProductsClaireRowland,ElizabethGoodmanet.alO'ReillyFirstEdition,2015

WeblinksandVideo Lectures(e-Resources):

- https://www.youtube.com/watch?v=WUYAjxnwjU4&list=PLE7VH8RC_N3bpVn-e8QzOAHziEgmjQ2qE

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	DevelopschemesfortheapplicationsofIOTinrealtimescenarios	L1
CO2	Managethe Internetresources	L1
CO3	Modelthe Internetofthingstobusiness	L2
CO4	Understandthepracticalknowledgethroughdifferentcasestudies	L3

ProgramOutcomeofthiscourse

Sl.No.	Description	POs

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	x		x		x					
CO2		x							x	
CO3	x	x	x				x			x
CO4				x						

CloudSecurity			
Course Code	22SAM325	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:
- Ableto evaluatethedifferent typesofcloudsolutionsamongIaaS,PaaS, SaaS
- TogeneralizetheData Centreoperations,encryptionmethodsanddeployment details..

Module-1
CloudComputingArchitecturalFramework:CloudBenefits,Businessscenarios,CloudComputingEvolution, cloud vocabulary, Essential Characteristics of Cloud Computing, Clouddeployment models,CloudServiceModels,Multi-Tenancy,ApproachestocreateabarrierbetweentheTenants,cloudcomputing vendors, Cloud Computing threats, Cloud Reference Model, The Cloud Cube Model, Security forCloudComputing, HowSecurityGets Integrated.

Teaching-Learning Process	Chalkand Talk/PPT

Module-2
Compliance and Audit: Cloud customer responsibilities, Compliance and Audit Security Recommendations.PortabilityandInteroperability:Changingprovidersreasons,Changingprovidersexpectations, Recommendationsallcloudsolutions,IaaSCloudSolutions,PaaSCloudSolutions,SaaSCloudSolutions.

Teaching-LearningProcess	Chalkand Talk/PPT

Module-3
TraditionalSecurity,BusinessContinuity,Disaster Recovery,Risk ofinsiderabuse,Security baseline,Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility,VendorSecurityProcess (VSP).

Teaching-Learning Process	Chalkand Talk/PPT

Module-4
Data Center Operations: Data Center Operations, Security challenge, Implement Five Principal Characteristicsof Cloud Computing, Data center Security Recommendations. Encryption and Key Management: EncryptionforConfidentialityandIntegrity,Encryptingdataat rest,KeyManagement Lifecycle,CloudEncryption Standards,Recommendations.

Teaching-Learning Process	Chalkand Talk/PPT

Module-5
IdentityandAccessManagement:IdentityandAccessManagementinthecloud,IdentityandAccessManagementfunctions,IdentityandAccessManagement(IAM)Model,IdentityFederation,IdentityProvisioningRecommendations, AuthenticationforSaaSandPaascustomers,AuthenticationforIaaS customers, Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security

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	Recommendations.Virtualization:HardwareVirtualization,SoftwareVirtualization,MemoryVirtualization,Storage Virtualization,DataVirtualization,NetworkVirtualization,VirtualizationSecurityRecommendations.
Teaching-Learning Process	Chalkand Talk/PPT

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination)takentogether.

ContinuousInternalEvaluation:

- ThreeUnitTestseachof20 Marks
- Twoassignmentseachof20MarksoroneSkillDevelopment Activityof40marks
- toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities, willbescaleddownto50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined forthecourse.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreducedto50.
- Thequestionpaper will havetenfullquestionscarryingequalmarks.
- Eachfull questionisfor20marks.Therewill be twofull questions(withamaximumoffour sub-questions)fromeach module.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswer fivefullquestions,selectingonefullquestionfromeachmodule

SuggestedLearningResources:

Books

1. CloudSecurityandPrivacy,AnEnterprisePerspectiveonRisksandCompliance,TimMather,SubraKumaras wamy,Shahed Latif,OreillyMediaEducation,2009.

2. SecuringtheCloud,CloudComputerSecurityTechniquesandTactics,Vic(J.R.)Winkler,Syngress2011.

WeblinksandVideoLectures(e-Resources):

- https://www.javatpoint.com/cloud-computing-tutorial
- https://www.tutorialspoint.com/cloud_computing/index.htm
- https://www.digimat.in/nptel/courses/video/106105167/L01.html

SkillDevelopmentActivitiesSuggested

Thestudents withthehelpofthecourseteachercantakeup relevanttechnicalactivities whichwillenhancetheirskill.Thepreparedreportshall be evaluated for CIEmarks.

Courseoutcome(CourseSkillSet)   18

Attheend ofthecoursethestudent willbeableto:

Sl.No.	Description	Blooms
LevelCO1	Analyzeindustrysecuritystandards,certificates,regulatorymandates,audit policies,andcompliancerequirements.	L3
CO2	DemonstrethegrowthofCloudcomputing,architectureanddifferentmodules ofimplementation.	L3
CO3	Accessthesecurityimplementationflow,actionsandresponsibilitiesofstake holders.	L3

Mappingof COSand POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	X					X						
CO2		X	X									
CO3			X		X							

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Semester-III

<table>
<tr><td colspan="4" align="center">Financial Data Analytics</td></tr>
<tr><td>CourseCode</td><td>22SAM331</td><td>CIEMarks</td><td>50</td></tr>
<tr><td>TeachingHours/Week(L:P:SDA)</td><td>3:0:0</td><td>SEEMarks</td><td>50</td></tr>
<tr><td>TotalHoursofPedagogy</td><td>40</td><td>TotalMarks</td><td>100</td></tr>
<tr><td>Credits</td><td>03</td><td>ExamHours</td><td>03</td></tr>
</table>

CourseLearningobjectives:
- To provide a strong foundation in financial analytics in order to handle complex financial data, build advanced analytical models and deliver effective visualization product and comprehensivereports.

Module-1

UNIVARIATEDATADISTRIBUTIONS:ProbabilityDistributionsandTheirParameters,ObservationsandNonparametric DensityEstimation, MonteCarloComputations

Teaching-Learning Process	Chalkandboard/PPT/Webcontent

Module-2

DEPENDENCE&MULTIVARIATEDATAEXPLORATION:MultivariateDataandFirstMeasureofDependence, TheMultivariateNormalDistribution,MarginalsandMoreMeasuresofDependence,Copulas,PrincipalComponentAnalysis.

Teaching-Learning Process	Chalkandboard/PPT/Webcontent

Module-3

PARAMETRICREGRESSION:SimpleLinearRegression,RegressionforPrediction&Sensitivities,SmoothingVersusDistributionTheory,MultipleRegression,MatrixFormulationandLinearModels,PolynomialRegression,NonlinearRegression,TermStructureof InterestRates:ACrashCourse.

Teaching-Learning Process	Chalkandboard/PPT/Webcontent

Module-4

LOCALANDNONPARAMETRICREGRESSION:ReviewoftheRegressionSetup,BasisExpansionRegression,NonparametricScatterplotSmoothers,MoreYieldCurveEstimation,MultivariateKernel Regression,ProjectionPursuitRegression,NonparametricOptionPricing.

Teaching-Learning Process	Chalkandboard/PPT/Webcontent

Module-5

TIMESERIESMODELS:AR,MA,ARMA,&ALLTHAT:NotationandFirstDefinitions,TimeDependentStatisticsandStationarity,FirstExamplesofModels,FittingModelstoData,PuttingaPriceon Temperature.

Teaching-LearningProcess	Chalkandboard/PPT/Web content

AssessmentDetails(bothCIEandSEE)

TheweightageofContinuousInternalEvaluation(CIE)is50%andforSemesterEndExam(SEE)is50%.The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is40% of the maximum marks of SEE.A student shall be deemed to have satisfied the academic requirementsand earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marksoutof100)inthesumtotaloftheCIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)takentogether.

ContinuousInternalEvaluation:

1. ThreeUnitTests eachof**20Marks**
2. Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivityof40marks**
   toattaintheCOs andPOs

Thesumof threetests, twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIE methods /question paper is designedtoattain the different levels of Bloom's taxonomy as pertheoutcomedefinedforthecourse.

SemesterEndExamination:

1. TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreducedto50.
2. Thequestionpaperwillhavetenfullquestionscarrying equalmarks.
3. Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeachmodule.
4. Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
5. Thestudentswillhavetoanswerfivefullquestions,selecting onefullquestionfromeachmodule

SuggestedLearningResources:

TextBook:

1. *Statistical AnalysisofFinancial Datain R* , RenéCarmona SecondEdition

ReferenceBooks:

2. *ComputationalFinanceAnIntroductoryCourse*,ArgimiroArratia(2014),AtlantisPress,ISBN978-94-6239-069-0BernhardPfaff (2013),

3. *Financialriskmodellingandportfoliooptimization*,Wiley,ISBN978-0-470-97870-2Cairns,A.J.G(2004)

SkillDevelopmentActivitiesSuggested

Thestudentswiththehelpofthecourseteachercantakeuprelevanttechnical–activitieswhichwillenhancetheirskill. ThepreparedreportshallbeevaluatedforCIEmarks.

Courseoutcome(CourseSkillSet)

Attheendof thecoursethestudentwillbeableto:

Sl.No.	Description	BloomsLe
CO1	Analyseandmodelfinancialdata	L2
CO2	EvaluateandmodelRiskonvariousfinancialassets(canbeattained throughassignmentandCIE)	L3
CO3	UsethemostpowerfulandsophisticatedroutinesinPythonforanalytical finance(canbeattainedthroughassignmentandCIE)	L3

ProgramOutcomeofthiscourse

Sl.No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineeringfundamentals,andcomputerscienceandbusinesssystemstothesolutionofcomplex engineering andsocietalproblems.	Po1
2	Problemanalysis:Identify,formulate,reviewresearchliterature,andanalyzecomplexengineeri ngandbusinessproblemsreachingsubstantiatedconclusionsusingfirstprinciplesofmathematic s,naturalsciences,andengineeringsciences.	PO2
3	Design/developmentofsolutions:Designsolutionsforcomplexengineeringproblems and design system components or processes that meet the specified needswith appropriate consideration for the public health and safety, and the cultural,societal,andenvironmentalconsiderations.	PO3
4	Conductinvestigationsofcomplex problems:Useresearch-based knowledge andresearch methods including design of experiments, analysis and interpretation ofdata,andsynthesisof theinformationtoprovidevalidconclusions.	PO4
5	Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,and modernengineeringandITtoolsincludingpredictionandmodelingtocomplexengineeringactivit ieswithanunderstanding ofthelimitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge toassesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelev anttotheprofessionalengineering andbusinesspractices.	PO6
7	Environmentandsustainability:Understandtheimpactoftheprofessionalengineeringsolutions inbusinesssocietalandenvironmentalcontexts,anddemonstratetheknowledge of, andneedforsustainable development.	PO7
8	Ethics:Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilitiesandnormso ftheengineeringandbusinesspractices.	PO8
9	Individualandteamwork:Functioneffectivelyasanindividual,andasamemberorleaderindiverse teams, andinmultidisciplinarysettings.	PO9
10	Communication: Communicate effectively on complex engineering activities with theengineering community and with society at large, such as, being able to comprehendand write effective reports and design documentation, make effective presentations,andgiveandreceiveclearinstructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of theengineering,businessandmanagementprinciplesand applythesetoone'sownwork, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and life-long learning in the broadest context of technologicalchange.	PO12

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	x	x										
CO2	x		x									
CO3	x		x									

Semester-III

BusinessIntelligenceandAnalytics			
CourseCode	22SAM332	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:
- Beexposedwiththebasicrudimentsofbusinessintelligencesystem.
- ExplorethemodellingaspectsbehindBusinessIntelligence.
- Perceivethebusinessintelligencelifecycleandthetechniquesusedinit.
- Beexposedwithdifferentdata analysistoolsandtechniques.

Module-1	
BUSINESS INTELLIGENCE Effective and timely decisions – Data, information and knowledge – Role ofmathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enablingfactorsinbusinessintelligenceprojects–Developmentofabusinessintelligencesystem– Ethicsandbusinessintelligence.	
Teaching-Learning Process	Chalkandboard/PPT/ WebContent

Module-2	
KNOWLEDGE DELIVERY The business intelligence user types, Standard reports, Interactive Analysis andAdHocQuerying,ParameterizedReportsandSelf- ServiceReporting,dimensionalanalysis,Alerts/Notifications,Visualization:Charts,Graphs,Widgets,Scorecardsand Dashboards,GeographicVisualization,IntegratedAnalytics,Considerations:OptimizingthePresentationfortheRight Message.	
Teaching-Learning Process	Chalkandboard/PPT/ WebContent

Module-3	
EFFICIENCYEfficiencymeasures–TheCCRmodel:Definitionoftargetobjectives-Peergroups–Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Othermodels.Patternmatching– clusteranalysis, outlieranalysis	
Teaching-Learning Process	Chalkandboard/PPT/ WebContent

Module-4	
BUSINESSINTELLIGENCEAPPLICATIONSMarketingmodels–LogisticandProductionmodels–Casestudies.	
Teaching-LearningP rocess	Chalkandboard/PPT/ WebContent

Module-5	
FUTUREOFBUSINESSINTELLIGENCE:Futureofbusiness intelligence– EmergingTechnologies,MachineLearning,PredictingtheFuture,BISearch&TextAnalytics– AdvancedVisualization–RichReport, FuturebeyondTechnology.	
Teaching-Learning Process	Chalkandboard/PPT/ WebContent

AssessmentDetails(bothCIEandSEE)

TheweightageofContinuousInternalEvaluation(CIE)is50%andforSemesterEndExam(SEE)is50%.The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is40% of the maximum marks of SEE.A student shall be deemed to have satisfied the academic requirementsand earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marksoutof100)inthesumtotaloftheCIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)takentogether.

ContinuousInternalEvaluation:

1. ThreeUnitTests eachof**20Marks**
2. Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivityof40marks**
   toattaintheCOs andPOs

Thesumof threetests, twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIE methods /question paper is designedtoattain the different levels of Bloom's taxonomy as pertheoutcomedefinedforthecourse.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreducedto50.
- Thequestionpaperwillhavetenfullquestionscarrying equalmarks.
- Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeachmodule.
- Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
- Thestudentswillhavetoanswerfivefullquestions,selecting onefullquestionfromeachmodule

SuggestedLearningResources:

TextBooks:

- *DecisionSupportandBusinessIntelligence Systems*,EfraimTurban,Ramesh Sharda,DursunDelen,,9 thEdition,Pearson2013.
- *Business IntelligenceRoadmap:The Complete Project Lifecycle of DecisionMaking*,LarissaT.Moss,S.Atre, AddisonWesley, 2003.

ReferenceBooks:

- *BusinessIntelligence:DataMiningandOptimizationforDecisionMaking*,CarloVercellis,WileyPublications,2009.
- *BusinessIntelligence:The SavvyManager'sGuide*,DavidLoshinMorgan,KaufmanSecondEdition,2012.
- *SuccessfulBusinessIntelligence:SecretstoMakingBIaKillerApp*,CindiHowson,McGraw-Hill,2007.
- *The Data Warehouse Lifecycle Toolkit*,Ralph Kimball ,MargyRoss , Warren Thornthwaite,Joy Mundy,BobBecker,, WileyPublicationInc.,2007

WeblinksandVideoLectures(e-Resources):

- https://data-flair.training/blogs/business-intelligence/
- https://www.tutorialspoint.com/management_information_system/business_intelligence_system.h tm

SkillDevelopmentActivitiesSuggested

The students with the help of the course teacher can take up relevant technical –activities which willenhancetheirskill. ThepreparedreportshallbeevaluatedforCIEmarks.

Courseoutcome(CourseSkillSet)

Attheendof thecoursethestudentwillbeableto:

Sl.No.	Description	BloomsLe
CO1	ExplainthefundamentalsofbusinessintelligenceandLinkdataminingwithbusinessintelligence .	L1
CO2	Applyvariousmodellingtechniques.(canbeattainedthroughassignmentandCIE)	L3
CO3	Explainthedataanalysisandknowledgedeliverystages.	L2
CO4	Apply business intelligence methodstovarious situations.(can be attained throughassignmentandCIE)	L3
CO5	Decideonappropriatetechnique.	L2

ProgramOutcomeofthiscourse		
Sl.No.	**Description**	**POs**
1	Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals, and computer science and business systems to the solution of complexengineeringandsocietalproblems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complexengineeringandbusinessproblemsreachingsubstantiatedconclusionsusingfirstprinciples ofmathematics,naturalsciences,andengineeringsciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriateconsiderationforthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and researchmethodsincludingdesignofexperiments,analysisandinterpretationofdata,andsynthesis oftheinformationtoprovidevalidconclusions.	PO4
5	Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengineeringandITtoolsincludingpredictionandmodelingtocomplex engineeringactivitieswithanunderstandingofthelimitations	PO5
6	Theengineerandsociety:Applyreasoninginformedbythecontextualknowledgeto assesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessionalengineeringandbusiness practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineeringsolutions in business societal and environmental contexts, and demonstrate the knowledgeof,andneedforsustainabledevelopment.	PO7
8	Ethics:Applyethicalprinciplesand committo professionalethicsand responsibilitiesandnorms oftheengineeringandbusinesspractices.	PO8
9	Individualandteamwork:Functioneffectivelyasanindividual,andasamemberorleaderindiverse teams, andinmultidisciplinarysettings.	PO9
10	Communication: Communicate effectively oncomplexengineering activities withtheengineering community and with society at large, such as, being able to comprehend andwrite effective reports and design documentation, make effective presentations, and giveandreceiveclearinstructions.	PO10
11	Projectmanagementandfinance:Demonstrateknowledgeandunderstandingoftheengineering, business and management principles and apply these to one's own work, as amemberandleaderinateam,tomanageprojects andinmultidisciplinaryenvironments.	PO11
12	Life-longlearning:Recognizetheneedfor,andhavethepreparationandabilitytoengage in independentandlife-longlearninginthebroadestcontextoftechnologicalchange.	PO12

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x											
CO2	x				x							
CO3			x		x							
CO4	x				x							
CO5	x		x									

Semester-*III*

HumanComputerInterface			
CourseCode	22SAM333	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:
- Tofigureoutthebasicknowledge ontheories ofpsychologyandonhowthe humanbeinginteractswith(computer)systems.
- Explorethebusinessfunctionforuserinterfacedevelopment

Module-1
The User Interface: Introduction, Importance of the User Interface, Importance andbenefits of Good DesignHistory ofHuman Computer Interface.Characteristics ofGraphical and WebUser Interface: Graphical UserInterface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage,CharacteristicsofGUI.WebUserInterface,popularityofweb,CharacteristicsofWebInterface,Mergingof GraphicalBusinesssystems&theWeb,PrinciplesofUserInterfaceDesign

Teaching-Learning Process	Chalkandboard/PPT/Web content

Module-2
The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team,HumanInteractionwithComputers,ImportantHumanCharacteristicsinDesign,HumanConsiderationinDesign, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding ofUsers.

Teaching-Learning Process	Chalkandboard/PPT/Webcontent

Module-3
UnderstandingBusinessFunctions:BusinessDefinitions&Requirementanalysis,DeterminingBusinessFunctions, Design standards or Style Guides, System Training and Documentation, Principles of Good ScreenDesign: Human considerations in screen Design, interface design goals, test for a good design, screen meaningandpurpose,TechnologicalconsiderationsinInterfaceDesignSystemMenusandNavigationSchemes:Structure,Functions,Context,Formatting,PhrasingandSelecting,NavigatingofMenus,KindsofGraphicalMenusWindowsInterface:Windowscharacteristic,ComponentsofWindow,WindowsPresentationStyles, TypesofWindows,WindowManagement,Websystems.

Teaching-Learning Process	Chalkandboard/PPT /Web content/CaseStudy

Module-4
DeviceandScreen-BasedControl:Devicebasedcontrols,OperableControls,Textentry/read-OnlyControls,SectionControls,CombiningEntry/SelectionControls,OtherOperableControlsandPresentationControls,Selectingpropercontrols.

Teaching-LearningProcess	Chalkandboard/PPT/Webcontent

Module-5
EffectiveFeedbackGuidanceandAssistance:ProvidingtheProperFeedback,GuidanceandAssistanceEffectiveInternationalizationandAccessibility-Internationalconsideration,Accessibility,CreatemeaningfulGraphics,Icons andImages,Colors-uses, possibleproblemswithcolours,choosingcolors.

Teaching-LearningProcess	Chalkandboard/PPT /Web content/CaseStudy

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. Theminimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of themaximum marks of SEE.A student shall be deemed to have satisfied the academic requirements and earned thecredits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sumtotalof theCIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)takentogether.

ContinuousInternalEvaluation:

1. ThreeUnitTests eachof**20Marks**
2. Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivity**of **40marks**
   toattaintheCOs andPOs

Thesumof threetests, twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcomedefinedforthecourse.

SemesterEndExamination:

1. TheSEEquestionpaperwillbesetfor100marksandthe marksscoredwillbeproportionatelyreducedto50.
2. Thequestionpaperwillhavetenfullquestionscarrying equalmarks.
3. Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeachmodule.
4. Eachfullquestionwillhaveasub-questioncoveringallthetopics underamodule.
5. Thestudentswillhavetoanswerfivefullquestions, selecting onefullquestionfromeachmodule

SuggestedLearningResources:

TextBooks:

1. *FundamentalsofHumanComputerInteraction*,AndrewMonk1stEdition.
2. *TheEssentialGuidetoUserInterfaceDesign*, WilbertO.Galitz,Wiley, IndianEdition.

ReferenceBooks:

3. *Designingthe userinterfaces*,BenShneidermann,PearsonEducationAsia3rdEdition.
4. *UserInterfaceDesign*,Soren Lauesen,PearsonEducation.
5. *EssentialsofInteractionDesign*, AlanCooper,RobertRiemann,DavidCroninWiley.
6. *HumanComputerInteraction*,AlanDix,JanetFincay,GreGoryd,Abowd,Russell,BealgPearsonEducation.

WeblinksandVideoLectures(e-Resources):

- https://www.tutorialspoint.com/human_computer_interface/index.htm

SkillDevelopmentActivitiesSuggested

- The students with the help of the course teacher can take up relevant technical –activities which willenhancetheirskill. ThepreparedreportshallbeevaluatedforCIEmarks.

Courseoutcome(CourseSkillSet)

Attheendof thecoursethestudentwillbeableto:

Sl.No.	Description	BloomsLevel
CO1	Demonstratebasicknowledgeontheoriesofpsychologyand onhowthehuman	L3
CO2	beinginteractswith(computer)systems Giveinsightonhowknowledgeofthehumancapabilitiescaninfluencethewayin whichweconstructtechnicalsystems.	L2
CO3	ApplyMethodsandtechniquesfordesignandconstructionofuserinterfaces.	L4

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x									
CO2		x		x								
CO3	x		x									

Semester-III

AdvancedDataStructures			
CourseCode	22SAM334	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:

- Toexplorethebasicprinciplesand operationofdatastructures.
- Tosolve agivenproblemefficientlybyanalyzingand makinguseofappropriatedatastructures.

Module-1

Search Trees: Two Models of Search Trees. General Properties and Transformations. Height of aSearch Tree. Basic Find, Insert, and Delete. Returning from Leaf to Root. Dealing with NonuniqueKeys. Queries for the Keys in an Interval. Building Optimal Search Trees. Converting Trees intoLists. Removing a Tree. **Balanced Search Trees**: Height-Balanced Trees. Weight-Balanced Trees.(a,b)- andB-Trees. Red-BlackTreesandTreesofAlmostOptimalHeight.Top-DownRebalancing

forRed-BlackTrees.

Teaching-Learning Process	Chalkandboard/ PPT/ WebContent

Module-2

TreeStructuresforSetsofIntervals.IntervalTrees.SegmentTrees.TreesfortheUnionofIntervals.Treesfor SumsofWeightedInterval.TreesforInterval-RestrictedMaximumSumQueries. Orthogonal Range Trees. Higher-Dimensional Segment Trees. Other Systems of BuildingBlocks.Range-CountingandtheSemigroupModel.kd-Treesand RelatedStructures.

Teaching-Learning Process	Chalkandboard/ PPT/ WebContent

Module-3

Heaps:BalancedSearchTreesasHeaps.Array-BasedHeaps.Heap-OrderedTreesandHalf-Ordered Trees. Leftist Heaps. Skew Heaps. Binomial Heaps. Changing Keys in Heaps. FibonacciHeaps.HeapsofOptimal Complexity.Double-EndedHeapStructuresandMultidimensional Heaps

. Heap-Related StructureswithConstant-TimeUpdates.

Teaching-Learning Process	Chalkandboard/ PPT/ WebContent

Module-4

DataStructureTransformationsandStrings:MakingStructuresDynamic.MakingStructuresPersistent. Tries andCompressedTries.Dictionaries AllowingErrors inQueries.SuffixTrees.Suffix

Arrays.

Teaching-LearningProcess	Chalkandboard/ PPT/ WebContent

Module-5

HashTables:BasicHashTablesandCollisionResolution.UniversalFamiliesofHashFunctions.PerfectHash Functions.HashTrees.ExtendibleHashing.MembershipTestersandBloomFilters

Teaching-Learning	Chalkandboard/ PPT/ WebContent

	Chalkandboard/ PPT/ WebContent

Process	

AssessmentDetails(bothCIEandSEE)

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CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcomedefinedforthecourse.

SemesterEndExamination:

1. TheSEEquestionpaperwillbesetfor100marksandthe marksscoredwillbeproportionatelyreducedto50.
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3. Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeachmodule.
4. Eachfullquestionwillhaveasub-questioncoveringallthetopics underamodule.
5. Thestudentswillhavetoanswerfivefullquestions, selecting onefullquestionfromeachmodule

SuggestedLearningResources:

TextBooks:

1. *AdvancedDataStructures*,PeterBrass,CambridgeUniversityPress,2008.

ReferenceBooks:

2. *DataStructuresand AlgorithmAnalysisin C++,*MarkAllen Weiss,4thEdition,2014,Pearson.
3. *IntroductiontoAlgorithms*,ThomasHCormen,CharlesE.Leiserson,RonaldL.Rivest,CliffordStein,3rdEdition,2009,The MITPress.

WeblinksandVideoLectures(e-Resources):

- https://www.coursera.org/learn/advanced-data-structures
- https://nptel.ac.in/courses/106106133

SkillDevelopmentActivitiesSuggested

- The students with the help of the course teacher can take up relevant technical –activities which willenhancetheirskill. ThepreparedreportshallbeevaluatedforCIEmarks.

Courseoutcome(CourseSkillSet)

Attheendof thecoursethestudentwillbeableto:

Sl.No.	Description	
CO1	Explorethebasicprinciplesandoperationsofdatastructures.	L2
CO2	ApplyHashing,DisjointsetsandStringMatchingtechniquesforsolvingproblems effectively.(canbeattainedthroughassignmentandCIE)	L3
CO3	ApplytheconceptsofadvancedTreesandGraphsforsolvingproblemseffectively.(canbeattained throughassignmentandCIE)	L3
CO4	AnalyzethegivenscenarioandchooseappropriateDataStructureforsolvingproblems.(canbeattainedthroughassignmentandCIE)	L4

MappingofCOS andPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x									
CO2		x										
CO3	x	x										
CO4	x		x									

Semester-III

OBJECT ORIENTED DESIGN			
CourseCode	22SAM335	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

Course Learning objectives:
- To Introduce various designing techniques and methods for object oriented.
- Performance analysis with real time system.
- Demonstrate a familiarity with object oriented data and system.
- To give clear idea on implementing design with UML diagram like state diagram , activity diagram , use case diagram etc.

Module-1
The Motivation for Object-Oriented Programming, Classes and Objects: The Building Blocks of the Object-Oriented ParadigmTopologies of Action-Oriented Versus Object-Oriented Applications

Teaching-Learning Process	Chalkandboard,PPT

Module-2
The Relationships Between Classes and ObjectsThe Inheritance Relationship

Teaching-LearningProcess	Chalkandboard,PPT

Module-3
Multiple Inheritance, The Association Relationship,

Teaching-Learning Process	Chalkandboard,PPT

Module-4
Class-Specific Data and Behaviour, Physical Object-Oriented Design,

Teaching-LearningProcess	Chalkandboard,PPT

Module-5

	The Relationship Between Heuristics and Patterns, The Use of Heuristics in Object-Oriented Design	
Teaching-Learning Process	Chalkandboard,PPT	2

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. Theminimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of themaximum marks of SEE.A student shall be deemed to have satisfied the academic requirements and earned thecredits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sumtotalof theCIE(ContinuousInternalEvaluation)andSEE(SemesterEndExamination)takentogether.

ContinuousInternalEvaluation:

1. ThreeUnitTests eachof**20Marks**
2. Twoassignmentseachof**20Marks**or**oneSkillDevelopmentActivity**of **40marks**
   toattaintheCOs andPOs

Thesumof threetests, twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcomedefinedforthecourse.

SemesterEndExamination:

- TheSEEquestionpaperwillbesetfor100marksandthe marksscoredwillbeproportionatelyreducedto50.
- Thequestionpaperwillhavetenfullquestionscarrying equalmarks.
- Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeachmodule.
- Eachfullquestionwillhaveasub-questioncoveringallthetopics underamodule.
- Thestudentswillhavetoanswerfivefullquestions, selecting onefullquestionfromeachmodule

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Suggested Learning Resources:
Text Books:
   1. *Object Oriented Design Heuristic.* Arthur J Riel. Addison-Wesley. 1996.
Refence Books:
   1. *Elements of Reusable ObjectOriented Software.* Ralph Johnson, Erich Gamma, Richard Helm, John Vlissides. Pearson.
1. *Object - Oriented Modeling and Design With UM.* Paperback, Michael R. Blaha. Pearson. 2007

WeblinksandVideoLectures(e-Resources):

- https://www.youtube.com/watch?v=WpJ_yiwbGyk&list=PLJ5C_6qdAvBHslIkD7JB7kBdgv1SeXy3P
- https://www.geeksforgeeks.org/oops-object-oriented-design/
-

SkillDevelopmentActivitiesSuggested

-

Courseoutcome(CourseSkillSet)

Attheendof thecoursethestudentwillbeableto:

Sl.No.	Description	BloomsLevel
CO1	Identify the heuristics of the object-oriented programming	L1
CO2	Explain the fundamentals of OOP	L1
CO3	Examine fine object-oriented relations	L2
CO4	Explain the role of Physical Object-Oriented Design,	L2

ProgramOutcomeofthiscourse

Sl.No.	Description	POs

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

PROJECT WORKPHASE-1			
CourseCode	22SAM34	CIE Marks	100
NumberofcontactHours/Week	6	SEEMarks	--
Credits	03	ExamHours	--

Courseobjectives:

- Supportindependent learning.
- Guidetoselectandutilizeadequateinformationfromvariedresourcesmaintainingethics.
- Guidetoorganizetheworkintheappropriatemannerandpresentinformation(acknowledgingthesources)clearly.
- Develop interactive, communication, organisation, time management, andpresentationskills.
- Impartflexibilityandadaptability.
- Inspireindependentandteamworking.
- Expandintellectualcapacity,credibility,judgement,intuition.
- Adheretopunctuality,settingandmeetingdeadlines.
- Instilresponsibilitiestooneselfandothers.
- Trainstudentstopresentthetopicofprojectworkinaseminarwithoutanyfear,face audienceconfidently,enhancecommunicationskill, involvein group discussiontopresentandexchangeideas.

Project Phase-1 Students in consultation with the guide/s shall carry out literaturesurvey/visitindustriesto finalizethetopicoftheProject.Subsequently, the studentsshallcollectthematerialrequiredfortheselectedproject,preparesynopsisandnarratethemethodologytocarryouttheprojectwork.

Seminar: Eachstudent,undertheguidanceofaFaculty,isrequiredto

- Presenttheseminarontheselectedprojectorallyand/orthroughpowerpointslides.
- Answerthequeriesandinvolveindebate/discussion.
- Submittwocopiesofthetypedreportwithalistofreferences.

Theparticipantsshalltakepartindiscussiontofosterfriendlyandstimulatingenvironmentin whichthestudentsaremotivatedtoreachhighstandardsandbecome self-confident.

Courseoutcomes:

Attheendofthecoursethestudentwillbeableto:

- Demonstrateasoundtechnicalknowledgeoftheirselectedprojecttopic.
- Undertakeproblemidentification,formulation,andsolution.
- Designengineeringsolutionstocomplexproblemsutilisingasystems approach.
- Communicate with engineers and the community at large in written an oralforms.
- Demonstratetheknowledge, skillsandattitudesofaprofessionalengineer.

ContinuousInternalEvaluation

CIEmarks fortheprojectreport(50marks),seminar (30marks)andquestionandanswer(20marks)shallbeawarded(basedonthequalityofreport andpresentationskill,participationinthequestionandanswer session by the student) by thecommitteeconstitutedforthepurposebytheHeadoftheDepartment.Thecommitteeshallconsistofthreefacultyfromthedepartmentwiththeseniormostactingasthe Chairperson.

SocietalProject			
CourseCode	22SAM35	CIE Marks	100
NumberofcontactHours/Week	6	SEEMarks	__
Credits	3	ExamHours	03

Courseobjectives:
- BuildcreativesolutionsfordevelopmentproblemsofcurrentscenariointheSociety.
- Utilizetheskillsdevelopedinthecurriculumtosolvereallifeproblems.
- Improveunderstandinganddevelopmethodologyforsolvingcomplexissues.

Someofthedomainstochooseforsocietalprojects:
- Infrastructure
- HealthCare
- Socialsecurity
- Securityforwomen
- Transportation
- BusinessContinuity
- RemoteworkingandEducation
- DigitalFinance
- FoodSecurity
- Ruralemployment
- Waterandlandmanagement
- Pollution
- FinancialIndependence
- AgriculturalFinance
- PrimaryHealthcare
- Nutrition
- ChildCare
- E-learning
- Distanceparenting
- MentorshipEtc

Courseoutcomes:
Attheendofthecoursethestudentwillbeableto:
- Buildingsolutionforreallifesocietalproblems.
- Improvementoftheirtechnical/curriculumskills

ContinuousInternalEvaluation:
Identifyingthereallifeproblemsandproducingliteraturereport:20marksDatasamplingandCleaning:10Marks
EstablishingtherightObjective:10MarksDevelopingthesolution:20Marks

Propagatingthesolutiontothestakeholders1)Lectures 2)Social Meetings 3)Socialmedia 4)Street plays 5)Advertisement Either of the 3(evidence of the work through Geotagphoto) certified by stake holders and authorized by concerned government authorities.
ProjectReport:20marks.Thebasisforawardingthemarksshallbetheinvolvementof the student in the projectand inthepreparationof projectreport. To be awarded bytheinternalguideinconsultationwithexternalguideifany.
Project Presentation:10marks.
The Project Presentation marks of the Project Work Phase -II shall be awarded by thecommittee constitutedforthepurposebytheHeadof the Department.The committeeshallconsistofthreefacultyfromthedepartment withthe senior mostacting astheChairperson.
Evelution:10marks.
The student shall be evaluated based on the ability in the Question and Answer sessionfor10marks.

INTERNSHIP			
CourseCode	22SAM36	CIE Marks	50
NumberofcontactHours/Week	3	SEEMarks	50
Credits	06	ExamHours	03

Courseobjectives:

Internship/Professionalpracticeprovidestudentstheopportunityofhands-onexperience that include personal training, time and stress management, interactiveskills,presentations,budgeting,marketing,liability andriskmanagement,paperwork,equipment ordering, maintenance, responding to emergencies etc. The objective arefurther,

Toputtheoryintopractice.

To expand thinking and broaden the knowledge and skills acquired throughcourse work inthe field. Torelate to,interactwith,and learnfromcurrentprofessionalsinthefield.

Togainagreaterunderstandingofthedutiesandresponsibilitiesof a professional.

Tounderstandandadheretoprofessionalstandardsinthefield.

Togaininsighttoprofessionalcommunicationincludingmeetings,memos,reading,writing, publicspeaking,research,clientinteraction,inputofideas,andconfidentiality.

Toidentifypersonalstrengthsandweaknesses.

Todeveloptheinitiativeandmotivationtobeaself-starterandworkindependently.

Internship/Professionalpractice: Students under the guidance of internal guide/sandexternalguideshalltakepartinalltheactivitiesregularlytoacquireasmuchknowledgeaspossiblewithoutcausinganyinconvenienceattheplaceofinternship.

Seminar: Eachstudent,isrequiredto

- Presenttheseminaron theinternshiporallyand/orthroughpowerpointslides.
- Answerthequeriesandinvolveindebate/discussion.
- Submitthereportdulycertifiedbytheexternalguide.
- Theparticipantsshalltake partindiscussiontofosterfriendlyandstimulating environmentinwhichthestudentsaremotivatedtoreachhighstandardsandbecomeself-confident.

Courseoutcomes:

Attheendofthecoursethestudentwillbeableto:

- Gainpracticalexperiencewithinindustryinwhichthe internshipisdone.
- Acquireknowledgeoftheindustryin whichtheinternshipisdone.
- Applyknowledgeandskillslearnedtoclassroomwork.
- Developagreaterunderstandingaboutcareeroptionswhilemoreclearlydefiningpersonalcareergoals.
- Experiencetheactivitiesandfunctionsofprofessionals.
- Developandrefineoralandwrittencommunicationskills.
- Identifyareasforfutureknowledgeandskilldevelopment.
- Expandintellectualcapacity,credibility,judgment,intuition.
- Acquiretheknowledge ofadministration,marketing,financeandeconomics.

ContinuousInternalEvaluation

CIEmarksfortheInternship/Professionalpracticereport(30 marks), seminar (10marks) andquestionandanswersession(10marks)shallbeawarded(basedonthequalityofreport and presentationskill, participation in the question and answer sessionbythestudent)bythecommitteeconstitutedforthepurpose bytheHeadoftheDepartment. The committee shall consist of three faculty from the department with theseniormostactingastheChairperson.

SemesterEndExamination

SEE marks for the internship report (20 marks), seminar (20 marks) and question andanswersession(10marks)shallbeawarded(basedonthequalityofreportandpresentationskill,participationinthequestionandanswersession)bytheexaminers appointedbytheUniversity.

PROJECT WORKPHASE-2			
CourseCode	22SAM41	CIE Marks	100
Practical/Fieldwork/Week	8	SEEMarks	100
Credits	18	ExamHours	03

Courseobjectives:

- Tosupportindependentlearning.
- Toguidetoselectandutilizeadequateinformationfromvariedresourcesmaintaining ethics.
- Toguidetoorganizetheworkintheappropriatemannerandpresentinformation(acknowledgingthesources)clearly.
- Todevelopinteractive,communication,organization,timemanagement,andpresentationskills.
- Toimpartflexibilityandadaptability.
- Toinspireindependentandteamworking.
- Toexpand intellectualcapacity,credibility,judgement,intuition.
- Toadheretopunctuality,settingandmeeting deadlines.
- Toinstillresponsibilitiestooneselfandothers.
- Totrainstudentstopresentthetopicofprojectworkinaseminarwithoutanyfear,faceaudience confidently,enhancecommunicationskill,involveingroupdiscussiontopresentandexchangeideas.

ProjectWork Phase-II: Eachstudentoftheprojectbatchshallinvolveincarryingoutthe project workjointly in constant consultation with internal guide, co-guide, andexternalguideandpreparetheprojectreportasperthenormsavoidingplagiarism.

- FollowtheSoftwareDevelopmentlifecycle
- DataCollection,Planning
- DesigntheTestcases
- Validationandverificationofattainedresults
- Significanceofparametersw.r.tscientificquantifieddata.
- PublishtheprojectworkinreputedJournal.

Courseoutcomes:

Attheendofthecoursethestudentwillbeableto:

- Presenttheprojectandbeabletodefendit.
- Makelinksacrossdifferentareas of knowledge and to generate, developandevaluateideasandinformationsoastoapplytheseskillstotheprojecttask.
- Habituatedtocritical thinkinganduseproblemsolvingskills
- Communicateeffectivelyandtopresentideasclearlyandcoherentlyinboththewritten andoralforms.
- Workinateamto achieve common goal.
- Learnontheirown,reflectontheirlearningandtakeappropriateactionstoimproveit.

ContinuousInternalEvaluation:

ProjectReport:20marks.Thebasisforawardingthemarksshallbetheinvolvementof the student in the projectand inthepreparationofprojectreport. To be awarded bytheinternalguideinconsultationwithexternalguideifany.

Project Presentation:20marks.

The Project Presentation marks of the Project Work Phase -II shall be awarded by thecommittee constitutedforthepurposebytheHeadof the Department.The committeeshallconsistofthreefacultyfromthedepartment withthe senior mostacting astheChairperson.

ProjectExecution:50Marks

The Project Execution marks of the Project Work Phase -II shall be awarded by the committeeconstituted for the purpose by the Head of the Department. The committee shall consist ofthreefacultyfromthedepartmentwiththeseniormostactingastheChairperson.

QuestionandAnswer:10marks.

ThestudentshallbeevaluatedbasedontheabilityintheQuestionandAnswersession

for10marks.

SemesterEndExamination

SEE marks for the project report (60 marks), seminar (30 marks) and question andanswer session (10 marks) shall be awarded (based on the quality of report andpresentation skill, participation in the question and answer session) by the examinersappointedbytheUniversity.