Kolhapur Institute of Technology's

College of Engineering, Kolhapur

(An Autonomous Institute)

Syllabus

For
Final Year B.Tech

Computer Science & Engineering

Academic Year 2020-2021

SEM-I

Title of the Course: Distributed Systems	**L**	**T**	**P**	**Credit**
Course Code:UCSE0701	3	--	--	3

Course Pre-Requisite: Knowledge of Operating system, Network Programming

Course Description: This course aims at giving students a basic knowledge of distributed systems, cluster computing, grid computing and cloud computing. Emphasis on communication between distributed systems and synchronization algorithms

Course Learning Objectives:

1. Understand foundation of Distributed Systems
2. Understand basic concepts of Grid Computing
3. Understand in detail the system level and support required for distributed system
4. Understand principles of High Performance Computing

Course Outcomes:

CO	**After the completion of the course the student should be able to**
CO1	Explain foundation of Distributed Systems
CO2	Demonstrate different synchronization techniques in distributed Systems
CO3	Compare communication in distributed systems with RPC
CO4	Discuss Parallel Programming architecture

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		1										1		
CO2		1		1								1		
CO3		1										1		
CO4		1		1								1		1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE-I	10
MSE	30
ISE-II	10
ESE	50

ISE-1 and ISE-2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

	Hrs.
Unit 1: Principles of distributed computing Eras of computing, Elements of distributed computing – General concepts and definitions, architectural styles for distributed computing, Examples of distributed System.	6 **Hrs.**
Unit 2: High Performance grid computing Introduction to grid, Open Grid Service Architecture (OGSA), Open Grid Service Infrastructure (OGSI), The Globus Toolkit 3 (GT3), OGSI.Net Middleware Solution.	7 **Hrs.**
Unit 3: Distributed system Communication Fundamentals, Remote Procedure Call, Remote Method Invocation(RMI), Message-oriented communication, Message Passing Interface(MPI), Stream-oriented communication, Multicast communication.	06 Hrs
Unit 4: Cluster Computing Scheduling parallel jobs on clusters, Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing, Cluster System – Beowlf, COMPaS and NanOS.	06 Hrs
Unit 5: Synchronization Clock Synchronization- Physical Clocks, Global Positioning System, Clock Synchronization Algorithms. Logical Clocks, Mutual Exclusion- A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm. Election **Algorithms- Traditional** Election Algorithms, Elections in Wireless Environments, Elections in Large-Scale Systems.	07 Hrs

Unit 6 : Parallel Programming Concepts Levels of parallelism (instruction, transaction, task, thread, memory, function)Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven **.**Computation etc) Architectures: N-wide superscalar architectures, multi-core, multi-threaded.	06 Hrs

Textbooks:

1. Distributed Systems: Principles and Paradigms- Tanenbaum, Steen.
2. The Grid Core Technologies", Maozhen Li, Mark Baker, (Wiley)
3. High performance cluster computing vol 1 rajkumarbuyya
4. DISTRIBUTED SYSTEMS Concepts and Design Fifth Edition - George Coulouris Pearson Education, 2012.

References:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.
3. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003.

Title of the Course: Advanced Database Systems	L	T	P	Credits
Course Code: UCSE0702	3	---	--	3

Course Pre-Requisite: Database Engineering

Course Learning Objectives:

1. To understand the fundamentals of object oriented databases.
2. To evaluate and distinguish the different types of advanced databases.
3. To understand and perform common database administration and security tasks.
4. To understand the usage of advanced data models

Course Outcomes:

COs	After the completion of the course the student will be able to
CO1	Understand and identify issues arising from parallel and distributed processing of data
CO2	Select appropriate database and construct solution to real world problems of storing large data.
CO3	Compare and Contrast NoSQL databases with each other and Relational Database Systems
CO4	Make use of XML,SQL cursors, triggers, stored procedures and procedural SQL to write complex SQL scripts
CO5	List database administration tasks and security measures

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE-I	10
MSE	30
ISE-II	10
ESE	50

ISE will be based on assignment/declared test/quiz/seminar/Group Discussions etc.

ESE: Assessment is based on 100% course content with 60-70% weight course content.

Unit 1: Object Oriented Databases Overview, Complex Data Types, Structure Types and Inheritance in SQL, Table Inheritance,Arrays and Multiset Types in SQL, Object-Identity and Reference Types in SQL,Implementing O-R Features, Persistent Programming Languages, Object-Relational Mapping,Object-Oriented versus Object-Relational	6 **Hrs**
Unit 2: Parallel and Distributed Databases Database System Architectures: Centralized and Client – Server Architectures –Server System Architectures – Parallel Systems – Distributed Systems – ParallelDatabases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies.	8 **Hrs**
Unit 3: Advanced SQL ORACLE sequences. Procedural SQL-Triggers, Stored Procedures, PL/SQL, Cursors.Embedded SQL – Dynamic SQL.XML Databases- DTD and XML Schemas, XML presentation, XML Applications.	7 **Hrs.**
Unit 4: NoSQL Databases Introduction, Data management with distributed databases, ACID and BASE NoSQL Types: Key-Value Database, Document Database, Column Family Database and Graph DatabaseComparison of relational databases and NoSQL	8 **Hrs.**
Unit 5: Database Administration and Security Database Administration Function. Database Administration Tools-Data dictionary, CASE tools.Database Security-Security policies, vulnerabilities and measures. Case Study: DBA using ORACLE database administration.	5 **Hrs.**
Unit 6: Business Intelligence and Data Warehouses The Need for Data Analysis, Business Intelligence, Business Intelligence Architecture, Decision Support Data, Online Analytical Processing, Star Schemas, Implementing a Warehouse, Data Mining, SQL Extension for OLAP.	8 **Hrs.**
Text Books: 1. Database system concepts – Silberschatz, Korth, Sudarshan – 6th Edition (MGH) 2. Database Management System – Raghu Ramkrishnan (MGH). **3.** Database Systems, Design, Implementation and Management - Coronel-Morris- Rob	

4. NoSQL for Mere Mortals- Dan Sullivan- 1st Edition, Pearson Education

Reference Books:

1. Database Systems - Elmasri and Navathe 5th edition, Pearson Education.
2. Advanced Database Management System – Rini Chakrabarti -Shilbhadra Dasgupta
3. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence - Pramod J. Sadalage, Martin Fowler-1st Edition, Pearson Education

Title of the Course: Professional Elective-III (Natural Language Processing)	L	T	P	Credit
Course Code: UCSE0721	3	-	-	3

Course Prerequisites: Formal Languages Theory, Probability, Natural Language Features

Course Description: This course introduces different algorithms for natural language processing. It also gives an overview of different applications of natural language processing.

Course Learning Objectives:

1. To introduce the field of Natural Language Processing to the students
2. To introduce the algorithms of syntax analysis of natural languages to the students
3. To introduce the algorithms of semantics analysis of natural languages to the students
4. To give an overview of the applications in the field of natural language processing

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	explain phases in the processing of natural languages
CO2	apply algorithms for syntax analysis of natural languages
CO3	apply algorithms for semantic analysis of natural languages
CO4	identify real life problems for application of Natural Language Processing

CO-PO Mapping:

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

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
UNIT-I : Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought and Understanding, N-grams, Part-of-speech tagging	**06 Hrs.**
UNIT-II: Syntax Analysis: Dynamic Programming Parsing Methods, Partial Parsing, Probabilistic Context Free Grammars,Probabilistic CKY parsing of PCFG's, Learning PCFG Rule Probabilities, Problems and solutions of PCFG's	**07 Hrs.**
UNIT-III: Representing Semantics: Formal Meaning Representation, First-Order Logic, Representing Events and States, Syntax-Driven Semantic Analysis, Semantic Augmentations to Context-Free Grammar Rules, Quantifier Scope Ambiguity and Underspecification, Unification-Based Approaches to Semantic Analysis	**07 Hrs.**
UNIT-IV: Computational Lexical Semantics: Relations between Senses, WordNet: A Database of Lexical Relations, Word Sense Disambiguation, Supervised Word Sense Disambiguation, WSD: Dictionary and Thesaurus Methods	**07 Hrs.**
UNIT-V: Computational Discourse: Discourse Segmentation, Text Coherence, Reference Resolution, Reference Phenomena, Features and Algorithms for Pronominal Resolution	**08 Hrs.**
UNIT-VI: Applications: Named Entity Recognition, Relation Detection and Classification, Biomedical Information Extraction, Basic Dialogue Systems	**05 Hrs.**
Textbooks: 1. Speech and Language Processing- Daniel Jurafsky, James H. Martin	
References: 1. Natural Language Understanding- James Allen 2. Introduction to Natural Language Processing - Jacob Einstein 3. Natural Language Processing with Python - Bird, Klein, Loper	

Title of the Course: High Performance Computing **Course Code:** UCSE0722	**L**	**T**	**P**	**Credit**
	3	-	-	3

Course Pre-Requisite:

1. Computer Organization 2. Computer Algorithms

Course Description: This course covers the design of advanced modern computing systems. In particular parallel computers and their architectures. It also helps users to choose different parallel programming models for different applications. In this course students are exposed parallel programming tools such as openMP, MPI and CUDA through which simple parallel programs can be written.

Course Learning Objectives:

1. To introduce the current trends in computer architecture and programming model.
2. To understand and appreciate parallel program design methodologies.
3. To solve basic parallel problems using MPI, OpenMp and GPU.

Course Outcomes:

CO	**After the completion of the course the student should be able to**
CO1	Explain different parallel architectures models and terminologies of high performance computing
CO2	Choose design methodologies and parallel algorithms for optimization of real world problems.
CO3	Write and analyze the behaviour of high performance parallel programs for distributed memory architectures using MPI, Pthreads and OpenMP and can write simple programs for the GPU.

CO-PO Mapping:

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

CO-PSO Mapping:

CO	**PSO 1**	**PSO 2**
CO1	-	-
CO2	2	2
CO3	-	3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents: **38 Hours**

UNIT I: Introduction to Parallel hardware and software, need for high performance systems and Parallel Programming, SISD, SIMD, MISD, MIMD models, Performance issues.	06 **Hrs.**
UNIT II: Processors, PThreads, Thread Creation, Passing arguments to Thread function, Simple matrix multiplication using Pthreads, critical sections, mutexes, semaphores, barriers and conditional variables, locks, thread safety, simple programming assignments.	08 **Hrs.**
UNIT III: Open MP Programming: introduction, reduction clause, parallel for-loop scheduling, atomic directive, critical sections and locks, private directive, Programming assignments, n body solvers using openMP	06 **Hrs.**
UNIT IV: Introduction to MPI programming: MPI primitives such as MPI_Send, MPI-Recv, MPI_Init, MPI-Finalize, etc., Application of MPI to Trepizoidal rule, Collective Communication primitives in MPI, MPI derived datatypes, Performance evaluation of MPI programs, Parallel sorting algorithms, Tree search solved using MPI, Programming Assignments.	08 **Hrs.**
UNIT V: Introduction to GPU computing, Graphics pipelines, GPGPU, Data Parallelism and CUDA C Programming, CUDA Threads Organization, Simple Matrix multiplication using CUDA, CUDA memories.	06 **Hrs.**
UNIT VI: Bench Marking and Tools for High Performance Computing Environments, Numerical Linear Algebra Routines BLAS for Parallel Systems evaluation.	04**Hrs.**

Textbooks:

1. An Introduction to Parallel Programming, Peter S Pacheco, Elsevier, 2011
2. Programming Massively Parallel Processors, Kirk &Hwu, Elsevier, 2012

References:

1. **C**UDA by example: An introduction to General Purpose GPU Programming, Jason, Sanders, Edward Kandrit, Perason, 2011
2. CUDA Programming, Shame Cook, Elsevier
3. High Performance Heterogeneous Computing, Jack Dongarra, Alexey &Lastovetsky , Wiley
4. Parallel computing theory and practice, Michel J.Quinn, TMH

Title of the Course: Software Defined Network Course Code: (UCSE0723)	L	T	P	Credit
	3	-	-	3

Course Prerequisite: Computer Networks.

Course Description: This course gives insights of programmable network management technology.

Course Learning Objectives: Students will be exposed to:-

1. The concept of Software Defined Network (SDN) vs Traditional Network.
2. Fundamental Characteristics of SDN.
3. Specification of Open Flow.
4. Application of SDN.

Course Outcomes:

CO	After the completion of the course the student should beable to
CO1	Define Software Defined Network.
CO 2	Explain fundamental concepts of SDN.
CO3	Interpret OpenFlow Specification and its limitations.
CO4	Evaluate the network virtualization functions.

CO-PO Mapping:

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

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Unit 1:- Introduction to Networking: OSI layers; TCP/IP Protocol Suite; Distance vector and link state routing algorithms, Network protocols (ARP, BGP, OSPF, RIP, ICMP) and network topologies, limitations of traditional network.	6**Hrs.**
Unit 2:- Introduction to SDN: Overview of Traditional Networks and limitations,History and evolution of SDN, Architecture of SDN, Control plane and data plane separation, Advantages and Disadvantages.	8 **Hrs.**
Unit 3:- Working of SDN: Fundamental Characteristics of SDN, SDNOperation, SDN Devices, SDN Controller, SDN Applications, Network virtualization.	7 **Hrs.**
Unit 4:- Open Flow: Introduction, wire protocol, Replication, FAWG (Forwarding Abstraction Workgroup), configuration and Extensibility, Architecture, Open Flow Limitations.	7 **Hrs.**

Unit 5:-Network Function Virtualization: Introduction of NFV, Need of NFV, NFV Framework, NFV Architecture, NFV Management and Orchestration, NFV and SDN.	7 **Hrs.**
Unit 6:-SDN Applications: Using the Floodlight Controller, Using the OpenDaylight Controller,Use Cases of SDNs: Backbone Networks, Home Network , Traffic Engineering.	**6 Hrs.**

Textbooks:

1. Paul Goransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann, 2014.
2. SDN: Software Defined Networks, An Authoritative Review of NetworkProgrammability Technologies, By Thomas D. Nadeau, Ken Gray Publisher: O'Reilly Media

References:

1 SiamakAzodolmolky, "Software Defined Networking with OpenFlow", Packt Publishing, 2013
2 Kingston Smiler, "OpenFlow® Cookbook", Packt Publishing, 2015
3 Doug Marschke, Jeff Doyle, Pete Moyer, "Software Defined Networking (SDN): Anatomy of OpenFlow® Volume I". Lulu Publishing Services, 2015

Title of the Course: Professional Elective-III(Digital Image Processing) Course Code: UCSE0724	L	T	P	Credit
	3	-	-	3

Course Pre-Requisite:

1. Linear Algebra
2. Calculus
3. Programming in C

Course Description: This course aims to introduce fundamental concepts of Digital Image processing. It will start with representation of images, datastructures and eventually go towards standard image processing tasks such as various image enhancement, restoration, image compression, etc. It will also include some advanced topics such as Image segmentation techniques

Course Objectives:

1. To introduce the student to various image processing techniques.
2. To cover basic analytical methods which are widely used in image processing.
3. To encourage to apply image processing algorithms to real problems.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain the image processing fundamentals
CO2	Summarizedifferentimagepre-processingandfilteringtechniquestoenhancetheimagequality
CO3	Applyimage compression and segmentation Techniques.
CO4	Make use of image processing techniques for solving problems in computer science

CO-PO Mapping:

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

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Unit 1:-Introduction What is Image processing? Examples. FundamentalStepsinDigitalImageProcessing,ComponentsofanImageProcessingSystem,SamplingandQuantization,RepresentingDigitalImages(Datastructure),SomeBasicRelationshipsBetweenPixels-NeighborsandConnectivityofpixelsinimage	**7 Hrs**
Unit 2:-ImageEnhancement in the Spatial Domain: Some basic Gray level Transformations, Histogram Processing, Enhancement using Arithmetic/Logic Operations, Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement methods.	**6 Hrs**
Unit 3:-Image Enhancement in the Frequency Domain: Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphism Filtering, Implementation.	**6 Hrs.**
Unit 4:-Image Restoration: Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum, Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering. Wavelets and MultiResolution Processing : MultiResolution Expansions, Wavelet Transforms in One dimension, The Fast Wavelet Transform, Wavelet Transforms in Two Dimensions.	**7 Hrs.**
Unit 5 :-ImageCompression: Image Compression: Image Compression Models, Error-Free Compression, Lossy Compression, Image Compression Standards. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.	**7 Hrs.**
Unit 6:- ImageSegmentation: Introduction,Detectionofisolatedpoints,linedetection,Edgedetection,Edgelinking, Regionbasedsegmentation-Regiongrowing,splitandmerge technique,localprocessing,regionalprocessing,Houghtransform,SegmentationusingThreshold.	**7 Hrs.**
Textbooks: 1. Rafael C.Gonzalez, Richard E. Woods; "Digital Image Processing 'Addison Wesley Pubs (Second Edition), 2007. 2. Milan Sonka, Vaclav Hlavac, Roger Boyle Image Processing. Analysis, and Machine Vision (Second Edition, 2003).	
References: 1. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India. 2. S. Sridhar, Digital Image Processing, Oxford University Press, 2nd Ed, 2016. Module6:Toextractfeaturesintheimageusingsegmentationtechniques	

Title of the Course: OE-II Basics of Network Engineering **Course Code:**UOEL0711	**L**	**T**	**P**	**Credit**
	3	--	--	3

Course Pre-Requisite: Students shall have very basic information of computers, peripheral devices, Internet.

Course Description: In this course student will learn about configuring network and services.

Course Learning Objectives: Students will be exposed to:

1. Linux Operating System.
2. Network concepts and configurations.
3. Network Service Configuration eg. Web Server, FTP Server.
4. Administration of Servers.

Course Outcomes:

CO	**After the completion of the course the student should be able to**
CO1	List Operating System available for Networking Service.
CO2	Explain concepts of network engineering.
CO3	Solve networking problems in the organization.
CO4	Build custom solution to address the networking requirements of organization.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1					1							1	3	1
CO2		1										1	3	2
CO3	3	1	3	2	3	2			1			3	3	3
CO4	3	1	3	2	3	2			1			3	3	3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Uni1:-Introduction: Introduction to Linux Operating System. Open Source and Freeware software. Installation of Linux, KDE & GNOME Environment, Sessions, installing multimedia support, open-office suit.	**4 Hrs.**
Unit 2:- Linux Shell & File Structure: Commands- ls, cd, cp, mv etc, man pages, file	**Hrs.**

structure, Pipes, Job management. Shell Scripts – variables, set, unset, environment variables.	
Unit 3:- Networking:- Basics- IP address, Gateway, mask, Networking Utilities- ping, arp, network manager, routes, nmap. Concept of Ports, protocols, TCP/IP model. Trouble shooting networking connectivity issues.	**Hrs.**
Unit 4:- Services:- Configuration of Apache web Server, FTP Server, DHCP Server.	**Hrs.**
Unit 5:- Firewall:- IP tables firewall rules configuration to – block/allow selected packets, TCP/UDP packets, ports, protocols.	**Hrs.**
Unit 6:- Packets Forwarding: Port Forwarding, Masquerading.	**Hrs.**
Textbooks: 1.The Complete Reference Linux by Richard Petersen, McGraw Hill Education	
References: 1. https://www.netfilter.org/ 2. https://www.apache.org/ 3. https://www.linux.org/	

Title of the Course: Software Systems **Course Code**: UOEL0712	L	T	P	Credit
	3	-	-	3

Course Pre-Requisite: :

Course Description: In Software Systems students will learn necessary tools and techniques required for report writing and project management. This course will empower students with knowledge and practices that will help student in versioning project, testing authenticity of work, generating reports
and developing build for deployment of project.

CourseLearning Objective To give exposure to students

1. Various research project report writing tools.
2. Checking research work for genuinely and authenticity.
3. Different project management tools which can be used to track and manage progress of project.

Course Learning Outcomes: Students will be able to.

1. Select research project report writing tools.
2. Make use of plagiarism testing tools for checking research work for genuinity and authenticity.
3. Use project management tools to track and manage progress of project.

CO	After the completion of the course the student should be able to
CO 1	Select research project report writing tools.
CO 2	Make use of plagiarism testing tools for checking research work for genuinely and authenticity.
CO3	Make use project management tools to track and manage progress of project.

CO-PO Mapping:

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

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Assessment	Marks
ISE 1	10

MSE	30
ISE 2	10
ESE	50

Course Contents:	
Unit 1:--Effective Report Writing: LateX- using document classes. Inserting graphics, tables, references, TikZ- creating diagrams- flowcharts, workflow etc.	6 Hrs.
Unit 2:-- Language Checking Tools: Language Checking - grammar correction in document, proper use of verbs according to subject, Proper use of articles. Use of active and passive voice.use of tools like grammarly.	2 Hrs.
Unit 3:---Plagiarism Detection what is plagiarism, how to test article for plagiarism, avoiding self plagiarism, use of tools like viper, turnitin, ithenticate etc.	3 Hrs.
Unit 4:---Project Management Tools: Maintaining project versions using branching technique. use of tools like git, svnetc to manage project progress.Project Tracking Techniques- such as Agile, SCRUM	5 Hrs.
Unit 5:--Data Visualization and Analysis Techniques: Use of R and python for data analysis, use of PyPlot, GNUPlot for data visualization and analysis technique.	4 Hrs.
Unit 6:--Build Management Systems: Study of various build management systems- such as make, make install, WAF, configure etc.	4 Hrs.
Textbooks: 1. LaTeX: A Document Preparation System (2nd Edition)by Leslie Lamport 2. Learning Agile by Andrew Stellman& Jennifer Greene 3. Learning Python: Powerful Object-Oriented Programming 4th Edition by Mark Lutz 4. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data 1st Edition by Hadley Wickham, Garrett Grolemund	
References: 1. Git online documentation.https://git-scm.com/docs/git-help 2. Pyplot onlinedocumentationhttps://matplotlib.org/api/pyplot_api.html	

Title of the Course: AdvancedDatabase Systems Lab	**L**	**T**	**P**	**Credit**
Course Code: UCSE0731	**-**	**-**	**2**	**1**

Course Pre-Requisite: RelationalDatabases, Programming Language

Course Description: This course is designed to develop advanced database management and administration skills. It provides practical knowledge of OODB,XML and NoSQL databases, parallel and distributed database transactions, database security and analysis of data with OLAP operations.

CourseLearning Objectives:

1. To understand Fundamental Concepts parallel and distributed transaction processing.
2. To present the concepts and techniques of OODB, XML and NoSQL with itsimplementations.
3. To present procedural interfaces to SQL comprehensively
4. To give an introduction to database administration and security
5. To give a formal foundation on the data analysis and business intelligence

Course Outcomes:

CO	**After the completion of the course the student should be able to**
CO1	Design and create OO,XML and NoSQL databases for given scenario
CO2	Build PL/SQL blocks including stored procedures, stored functions, cursors, triggers
CO3	Demonstrate parallel and distributed transaction processing and data analysis with SQL extension.
CO4	Make use of database administration and security policies

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 33%, and 67% weights respectively.

Assessment	Marks
ISE	50
ESE - POE	50

ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on practical-oral examination.

Course Contents:

Experiment No. 1: Remote Database Connection **Aim and Objectives:** Make database connection to remote database for demonstration of distributed database **Theoretical Background:** Knowledge of distributed database storage and transaction processing	**02 Hrs.**
Experiment No. 2: Parallel join/sort algorithm **Aim and Objectives:** Demonstrate parallel query processing **Theoretical Background:** parallel query processing	**02Hrs.**
Experiment No. 3: Object Oriented Databases **Aim and Objectives:** Create and manage object oriented databases	**04 Hrs.**

Theoretical Background: SQL**,** OODB	
Experiment No.4: XML Database **Aim and Objectives:** Create and manage a semi structured database. **Theoretical Background:** SQL, XML, XPath and XQuery	**02Hrs.**
Experiment No. 5: PL/SQL **Aim and Objectives:** Make use of PL/SQL to build procedures, functions triggers and cursors to perform in database processing of data **Theoretical Background:** SQL,PL/SQL	**04Hrs.**
Experiment No. 6: OnLine Analytical Processing **Aim and Objectives: M**ake use of OLAP tools for demonstration of data analysis. **Theoretical Background:** OLAP, Data warehouses,DSS,BI	**02Hrs.**
Experiment No. 8: NoSQL Database creation **Aim and Objectives:** Create and manage NoSQL Databases **Theoretical Background:** NoSQLconcepts	**06Hrs.**
Experiment No. 7: Database Administration **Aim and Objectives:** Demonstrate database administration by creating users and roles **Theoretical Background:** Role of database administrator	**02Hrs.**
Experiment No. 8: Database security **Aim and Objectives:** Implementation of security policies(MAC and DAC) **Theoretical Background:** Mandatory access control and discretionary access control**.**	**02Hrs.**

Textbooks:

1. DataBase System Concept by Henry F. Korth, Abraham Silberschatz, Sudarshan (McGraw Hill Inc.) 6th Edition.
2. Database Systems- A practical approach to Design, Implementation and Management by Thomos Connolly, Carolyn Begg, 3rd Edition, Pearson Education
3. NoSQL for Mere Mortals- Dan Sullivan- 1st Edition, Pearson Education

References:

1. Fundamentals of Database Systems – by RamezElmasri and ShamkantNavathe Publisher -Pearson Education, 5th Edition.
2. Database Systems : Design, Implementation and management.- PeterRof, Carlos Coronel Publisher - Cengage Learning.
3. Principles of Database Systems by J.D. Ullaman (Galgotia Publications)
4. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence - Pramod J. Sadalage, Martin Fowler-1st Edition, Pearson Education

Title of the Course: Web Technology LAB Course Code: UCSE0732	L	T	P	Credit
	3	-	4	5

Course Pre-Requisite: Advanced Programming Laboratory, HTML and CSS

Course Description: Web Technology subject mainly deals with emerging web technology concepts and tools. It covers HTML,CSS, JSP, Servlet and Spring Boot MVC Technology.

Course Learning Objectives:

To expose students to:

1. Client Server technologies
2. Server side technologies
3. RESTful web services

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Apply knowledge of client side scripting
CO2	Demonstrate use of server side technologies
CO3	Design web application using MVC architecture.
CO4	Develop RESTful web application using server side technologies

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2	-	3	_	_	1	-	-	-	1	1	-
CO2	1	2	3	1	3	_	_	1	-	-	-	2	2	1
CO3	1	2	3	2	3	_	_	1	-	--	-	2	3	2
CO4	1	2	3	2	3	_	_	1	-	-	-	2	3	2

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having

50% and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE based on assignment/practical performance/quiz etc.

ESE: Assessment is based Practical Oriented Exam and Oral.

Course Contents:

Unit 1: Front End Web Designing and Client side Scripting **Introduction of HTML and CSS,** **Basics JavaScript:** Introduction to javascript, Basic program of javascript, Function, Event handling In Javascript, Validating HTML form data using javascript, getElementByName, getElementById(),, return value, focus, innerHTML	**06 Hrs.**
Unit 2: Servlet Introduction of servlet, servlet life cycle, Working with Apache Tomcat Server, Servlet Interface, HTTP Servlet, directory structure, deployment descriptor-web.xml, servlet in Eclipse, ServletRequest methods, reading HTML form data with servlet, database connectivity with relational DBMS	**07 Hrs**
Unit 3: JSP Introduction of JSP, directory structure, JSP life cycle, JSP API, JSP in eclipse, JSP Expressions, JSP Declerations, JSP Scriplets, JSP Bulit in objects, including files, reading HTML form data with JSP, Database Connectivity with RDBMS, create and deploy WAR file	**07 Hrs**
Unit 4: Getting Started With Spring Boot Introduction to MVC, MVC architecture and advantages ,Spring Boot starters, CLI, Gradle plugin, Application class, @Spring Boot Application, Build as a Runnable jar, Dependency injection, component scans, Configuration ,Externalize your configuration using application. Properties or YAML files, Context Root and Management ports, Logging.	**07 Hrs.**
Unit 5: Building Web Applications In Spring Boot Spring MVC Controllers Using Model Attributes, @Request Mapping and @Request	**07 Hrs**.

Param, Using a Model And View, Using images and templates for views, Using an Embedded database with Jdbc Template, Executing Sql scripts, Using a production database, JPA Data and JPA Repositories	
Unit 6: Restful Web Services: REST Overview (Characteristics/Capabilities, URI Templates, REST vs SOAP, REST and Spring MVC, Spring support for REST, @Request Mapping/@Path Variable, @Request Body, HTTP Method conversion, URI Templates and @ Path Variable, Writing RESTful Controllers/@Rest Controller , JSON Representations for Resources, Message Converters, Generating XML, JAXB and jackson Message Converters for XML, JAXB/@Xml Root Element, Content Negotiation, Client Requirements and Spring's Rest Template	**07 Hrs.**

Text Books:

1. Core-Servlet and JavaServer Pages Volume – 1, by Marty Hall, Larry Brown, Pearson Education 2nd Edition
2. Spring Boot in Action by Walls Craig
3. Pro Spring Boot by Felipe Gutierrez

Reference Books:

1. Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam -2nd Edition-Bryan Basham, Kathy Sierra, Bert Bates- O'REILLY
2. Mastering Spring Boot 2.0: Build modern, cloud-native, and distributed systems using Spring Boot. By Dinesh Rajput

Title of the Course: Distributed System Lab	**L**	**T**	**P**	**Credit**
Course Code:UCSE0733	**-**	**-**	**2**	**1**

Course Pre-Requisite: Knowledge of Operating system, Network Programming

Course Description: This course aims at giving students a basic knowledge of distributed systems, cluster computing, grid computing and cloud computing. Emphasis on communication between distributed systems and synchronization algorithms.

Course Learning Objectives:

1. Understand foundation of Distributed Systems
2. Understand basic concepts of Grid Computing
3. Understand in detail the system level and support required for distributed system
4. Understand principles of High Performance Computing

Course Outcomes:

	After the completion of the course the student should be able to
CO4	Apply the concepts of communication and simulate synchronization algorithms in distributed systems.
CO4	Analyze Grid and cluster computing tools
CO4	Develop the Application in Distributed Computing(Google App Engine)
CO4	Explain HPC Case Studies

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1		2	1	2	1							2		
CO2		2	1	1	1							2		
CO3	1	2	1	2	1							2	1	2
CO4		1	1	2	1							1		

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 33%, and 67% weights respectively.

Assessment	Marks
ISE	50
ESE - OE	50

ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on practical-oral examination.

Course Contents:

Experiment No. 1: Implementation of Remote Procedure Call (RPC) and RMI in distributed system.	**02 Hrs.**
Experiment No. 2: Implementation of Remote Method Invocation(RMI) in distributed system for transferring files	**02 Hrs.**
Experiment No. 3: Creating an Application using GoogleApp Engine	**02 Hrs.**

Experiment No. 4:Configure NTP server and Client for clock synchronization	**02 Hrs.**
Experiment No. 5: Simulation of Election algorithms	**02 Hrs.**
Experiment No. 6: Implementation of Mutual Exclusion algorithms	**02 Hrs.**
Experiment No. 7: S/W Simulation for Clock Synchronization in Distributed System using Lamport's Algorithm.	**02 Hrs.**
Experiment No. 8: Simulation of Distributed Commit	**02 Hrs.**
Experiment No. 9: Simulation of recovery techniques	**02 Hrs.**
Experiment No. 10: HPC-Grid Computing Use Globus Toolkit or equivalent and Develop a new Web Service for Calculator.	**02 Hrs.**

SEMI-II

Title of the Course: Internet of Things Course Code: UCSE0801	L	T	P	Credit
	2	-	-	2

- **Course Prerequisites:** Knowledge of Computer Networking, Knowledge of Micro Processors, Micro Controllers, Knowledge of Programming languages such as C, Assembly level.

Course Description: This course introduces the necessary fundamental principles of Internet of Things. It aims to develop various applications related to smart cities, agriculture etc.

Course Learning Objectives:

1. To learn basic concepts of Internet of Things (IoT) Technology
2. To become familiar with the basics of RFID, sensor and GPS technologies
3. To Analyze and choose different wireless technologies and IoT applications

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain key concepts and terminologies related to Internet of Things (IoT).
CO2	Compare different wireless technologies with respect to IoT.
CO3	Propose IoT solution for real life problems

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	2	-	2	-	-	-	-	-	-	-	-	-	2
CO3	-	-	2	2	1	1	-	-	-	-	-	-	3	2

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

UNIT-I : Introduction to Internet of Things& Python Programming:- Introduction , Physical design of IoT, Logical design of IoT, IoT Enabling Technologies,IoT Levels &deployment Templates. Features of Python, Identifiers, variables, operators, Input/Output, Setting up python programming environment	**06 Hrs.**
UNIT-II: Fundamental IoT Mechanisms & Key Technologies : **Structural aspects of the IoT**:Environment characteristics, Traffic characteristics ,scalability, Interoperability, Security and Privacy, Open architecture, **Key IoTTechnologies**:Device Intelligence, Communication capabilities, Mobility support, Device Power, Sensor Technology, RFID technology, Satellite Technology. **Evolving IoT Standards:** IETF IPv6 Routing Protocol for RPL Roll, Constrained Application Protocol(CoAP), REST, 6LoWPAN, ZigBee IP(ZIP)	**06 Hrs.**
UNIT-III: IoT Systems- Logical design using Python Introduction, Python Data Types & data structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time operations, Classes.	**05 Hrs.**
UNIT-IV: IoT Physical Devices & Endpoints: What is an IoT device, Exemplary Device: Raspberry Pi, About the board, Linux on Raspberry Pi, Raspberry Pi interfaces, Programming Raspberry Pi with Python	**04 Hrs.**
UNIT-V: IoT Physical Servers and Cloud Offerings : Introduction to Cloud storage models and communication API's, WAMP –AutoBahn for IoT, Amazon web services for IoT	**05 Hrs.**
UNIT-VI: Case studies Illustrating IoT Design: Introduction, Home automation, cities, Environment, Agriculture, Productivity applications.	**04 Hrs.**

Textbooks:

1. Internet of Things: A Hands-On Approach By ArshdeepBahga, Vijay Madisetti (Unit 1,3,4,5,6) .
2. Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Daniel Minoli, Wiley Publications.

References:

1. The Internet of Things: Connecting Objects to the Web, HakimaChaouchi, Wiley Publications

Title of the Course: Cloud Computing Course Code: UCSE0802	L	T	P	Credit
	3	-	-	3

Course Pre-Requisite:

1. Computer Networks
2. Operating System-I
3. Information Security

Course Description: Cloud Computingsubject mainly deals with the science of cloud computing covering aspects such as – evolution of cloud environment, its architecture, types, prominent cloud platform examples, virtualization techniques and migration, docker-container & Kubernetes, security and management.

Course Learning Objectives:

To expose students to:

1. Cloud Computing platform & Its architecture
2. Virtualization tools and techniques
3. Need of migration to cloud and virtual machine provisioning
4. Advanced concepts – docker, container and Kubernetes
5. Security & management concerns.

Course Outcomes:

CO	After the completion of the course the student should be able to -
CO1	Summarize the evolution of cloud and its basic concepts.
CO2	Summarize virtualization techniques, migration and provisioning of VM's in cloud environment.
CO3	Compare different architectures and platforms of cloud computing.
CO4	Interpret the advanced concepts, security and management in cloud computing

CO-PO Mapping:

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

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30

ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weight age for course content (normally last three modules) covered after MSE.

Course Contents:

Unit 1: Introduction Definition, Historical Developments, Computing Platforms and Technologies. Building cloud computing environments, Principles of Parallel and Distributed Computing: Parallel versus Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, and Technologies for Distributed Computing.	**06 Hrs.**
Unit 2: Virtualization Characteristics, Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization	**06 Hrs.**
Unit 3: Cloud Computing Architecture Cloud Reference Model, Types of Clouds – Public, Private, Hybrid and Community cloud, Types of Services – IaaS, PaaS, SaaS, Economics of Clouds, Open Challenges, Public Clouds: Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure.	**07 Hrs.**
Unit 4: Migration into cloud and Virtual machine Provisioning Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context.	**06 Hrs.**
Unit 5: Advanced Concepts – Docker, Container and Kubernetes: Introduction to CaaS, Why containers? Difference between Virtualization and Containers. Introduction to Containers, Docker and its architecture (Jain), Understanding Docker Container, Networking. Kuberentes – Introduction, Architecture. (cookbook) Case Study (Any case study available on the Internet such as - IBM, AWS, Google Qwiklabs using Kubernetes, docker container).	**04 Hrs.**
Unit 6: Cloud Security & Management: Fundamental cloud security – Basic terms and concepts, Threat agents, cloud security threats, case study example. Cloud Management Mechanisms - SLA management and case study. Cloud Security Mechanisms – PKI, IAM and SSO with case studies.	**07 Hrs.**

Textbooks:

1. Mastering Cloud Computing - Buyya R, Vecchiola C, Selvi S T, McGraw Hill Education (India), 2013 (Unit 1,2,3)
2. Cloud Computing - Principles and Paradigms - Buyya R, Broberg J, Goscinski A, Wiley,2011 (Unit 4)
3. Cloud Computing Concepts, Technology & Architecture - Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, (Unit 6)
4. A to z on Docker: A complete Hands-On Guide to Docker Container – Swapnil Jain (Unit 5)
5. Docker Cookbook - Sébastien Goasguen, O'reilly Nov. 2015 First Edition (Unit 5)

References:

1. Cloud Computing Bible - Barrie Sosinsky ,Wiley Publishing Inc. 2011(Unit,6)
2. Cloud Native DevOps with Kubernetes – John Arundel and Justin Domingus (Unit 5)

Title of the Course: IoT Lab Course Code: UCSE0831	L	T	P	Credit
	-	-	2	1

- **Course Prerequisites:** Knowledge of Computer Networking, Knowledge of Micro Processors, Micro Controllers, Knowledge of Programming languages such as C, Assembly level.

Course Description: This course introduces the necessary fundamental principles of Internet of Things. It aims to develop various applications related to smart cities, agriculture etc.

Course Objectives:

1. Implement basic programs using Python.

2. Make use of various sensors using Raspberry Pi& Intel Galileo kits.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to
CO1	Identify and solve the problems using Python.
CO2	Experiment with Raspberry Pi kit.
CO3	Experiment with Intel Galileo kit.

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO2	-	-	-	2	3	2	-	-	-	-	-	-	-	2
CO3	-	-	-	2	3	2	-	-	-	-	-	-	-	2

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.
MSE: Assessment is based on 50% of course content (Normally first three modules)
ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Experiment No. 1: Aim and Objectives: To understand data types in python, controlling statements, functions and variable scope in python. **Theoretical Background:** Identifiers, reserved keywords, variables, comments, operators, numbers **Experimentation:** Write a program to check the number is prime or not.	**02 Hrs.**
Experiment No. 2: Networking in python **Aim and Objectives:** To understand client server model **Theoretical Background:** Socket programming **Experimentation:** Implement simple client server message passing program	**02 Hrs.**
Experiment No. 3: File Read/Write operation in python **Aim and Objectives:** Understand file operation using python **Theoretical Background:** Basics of file handling **Experimentation:** Write a program to implement file read write operation using python	**02 Hrs.**
Experiment No. 4: Basic setup for Raspberry Pi **Aim and Objectives:** To understand Raspberry Pi Pin configuration, Raspberry Pi os setup	**02 Hrs.**
Experiment No. 5: Blinking LED **Aim and Objectives:** Installing GPIO library **Theoretical Background:** Python programming **Experimentation:** Write a program to implement blinking LED using Raspberry Pi	**02 Hrs.**
Experiment No. 6: Blinking LED **Theoretical Background:** Python programming **Experimentation:** Write a program to implement blinking LED using Intel Galileo kit.	**02 Hrs.**
Experiment No. 7: Implementation of IoT with Raspberry Pi **Aim and Objectives:** Writeprogram to implement application with Raspberry Pi **Theoretical Background:** Sensor, Actuators **Experimentation:** Implement DHT sensor interface with Raspberry Pi	**02 Hrs**
Experiment No. 8: Implementation of IoT with Intel Galileo kit **Theoretical Background:** Sensor, Actuators **Experimentation:** Implement DHT sensor interface Intel Galileo kit	**02 Hrs**
Experiment No. 9: Implementation of IoT with Intel Galileo kit **Theoretical Background:** Sensor, Actuators **Experimentation:** Implement Buzzer sensor interface Intel Galileo kit	**02 Hrs**
Experiment No. 10: Implementation of IoT with Intel Galileo kit **Theoretical Background:** Sensor, Actuators **Experimentation:** Implement Touch sensor interface Intel Galileo kit	**02 Hrs**
Textbooks: 3. Internet of Things: A Hands-On Approach By ArshdeepBahga, Vijay Madisetti (Unit 1,3,4,5,6) .	
References:	

Guidelines for Internship , Project –I & Project –II

As per the approved academic structure, students will be allowed to take internships during the 8th semester of B.Tech program. Below are the guidelines/rules and regulations for the students willing to opt for the internship -

1. During 7th semester students have the option of forming project groups. The number of members working in one project can vary from 1 member to a maximum of 4 members. Students working independently have an option to work on the project assigned to him/her by the organization which has accepted him/her as an intern. However, students working on a project in a group must complete a separate inhouse project, despite the internship.
2. The students, who do not have any internship opportunity at the beginning of the 7th semester, have to complete the inhouse project compulsory. Even though you may get an internship/sponsored project by the end of the 7th semester or during the 8th semester.
3. The internship duration can be between 16 weeks to 20 weeks. Students who get the internship will be exempted from attendance of lectures and practicals of courses during 8th semester. These students must have to complete all the ISE activities of 8th Semester using LMS (Learning Management System- KIT Moodle). It will be mandatory to all students (including internship students) to appear for the Mid Semester Exam (MSE) and End Semester Exams (ESE). Failing to do so, you will not be considered for the award of B. Tech degree. There will not be any extension/exemption from MSE and ESE exams. The rest of the rules and regulations related to academics and exam are all applied as it is.
4. Students who are not getting any internship have to compulsorily attend all the lectures and practicals of the 8th Semester. They will be governed by the regular academic policies which include - mandatory attendance criteria, failing to meet the attendance criteria students will be detained.
5. The department holds the final authority to accept or reject the internship offered to students. Department will check the credibility of the organization offering the internship to students. If the department finds the internship is unworthy, then students will not be allowed to join the organization. Such students are bound to complete the regular academics (including 8th-semester lectures and practical’s).