DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

CURRICULUM

FOR THE ACADEMIC YEAR 2022-23

VIIANDVIII SEMESTER B.E.

POOJYADODDAPPAAPPACOLLEGEOFENGINEERING

(Anautonomous collegeunderVTU)



KALABURGI

	POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI Department of Information science & Engineering Scheme of Teaching and Examination 2018-19 (Effective from the academic year 2018-19)												
SI.	SI. SI.												
No.	Course	and Course Code	Course Title	Teac Depart	Theory Lecture	Tutorial	Practical/ Drawing	Self Study	Duration in hours	SEE Marks	CIE Marks	Total Marks	Credit
1.	PC	19IS71	Internet of Things	ISE	4				03	50	50	100	4
2.	IPC	19IS72	Web Application Security	ISE	4				03	50	50	100	3
3.	PE	19IS73X	Elective - C	ISE	3	-			03	50	50	100	3
4.	PE	19IS74X	Elective – D	ISE	3				03	50	50	100	3
5	OE	19IS7OE	Open Elective	ISE	3				03	50	50	100	3
6	PC	19ISL71	Internet of Things lab	ISE		-	2		03	50	50	100	1
7	PC	19ISS1	Seminar/Case study/ Group work	ISE		-	1		03		50	50	1
8	PROJ	19ISP1	Project work Phase - I	ISE			2		03	50	50	100	2
9	INT	19ISIN74	Internship	(TO be c vacat	arried out du ions of VI ar	ring the nd VII s	e interver emesters	ning					
	Total 16 04 24 350 400 750 20												
	Note:PC:Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.												
	Internship: All the student admitted to III year of BE/B.Tech have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and/or VII and VIII semesters.												

ELECTIVE - C					
Sl.No	Course	Course-ID			
1	User interface design	19IS731			
2	Software Architecture	19IS732			
3	Storage Area Network	19IS733			

ELECTIVE - D					
Sl.No	Course	Course-ID			
1	Machine Learning	19IS741			
2	Real time systems	19IS742			
3	Mobile Adhoc Network	19IS743			

OPEN ELECTIVE						
Sl.No	Course	Course-ID				
1	Data Analytics using Python	19IS7OE				

POOJYA DODDAPPA APPA COLLEGE OF
ENGINEERING, KALABURAGI.
Department of Information science & Engineering
Scheme of Teaching and Examination 2018-19
(Effective from the academic year 2018-19)

	VIII Semester											
				ıt	Teachi	Teaching Hours/Week			Examination			
SI. No.	Cour Cours	rse and se Code	Course Title	Teaching Departmer	Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	SEE Mar	CIE Mar	Total Marks	Credits
1.	IPC	19 IS 81	Virtual Augmented Reality	ISE	2		2	03	50	50	100	3
2.	PE	19IS82X	Professional Elective E	ISE	3	2		03	50	50	100	3
3.	PE	19IS8OE	Open Elective	ISE	3	-		03	50	50	100	3
4	OE	19ISMC84	Certification Course (NPTEL/ MOOC)	ISE		2			-	-	-	1
5	PC	19ISP2	Project Work Phase- II	ISE		-	03	03	50	50	100	8
6	INT 19ISIM81 Internship (Completed During the intervening - 50 50 2 vacations of VI and semesters and /or VII and VIII Semesters.)						2					
			Total		09	04	03	12	200	250	450	20
	Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.											
	Internship: All the student admitted to III year of BE/B. Tech have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and/or VII and VIII semesters.											

OPEN ELECTIVE						
Sl.No	Course	Course-ID				
1	Web Technology and Applications	19IS8OE				

ELECTIVE - E						
Sl.No	Course	Course-ID				
1	Big Data Analytics	19IS821				
2	Digital Image Processing	19IS822				
3	Game Theory	19IS823				

INTERNET OF THINGS					
Subject Code	19IS71	Credits:04			
CIE:50	SEE: 03hours				
	Hours/Week:4hours(Theory)	Total Hours:52			
Prerequisite: The student networking , automation	s should have the thorough knowledge of hardware inter and UI/UX design.	facing, IP			
 Course Objectives: To enable the students to obtain the knowledgeofInternet Of Things in the following topics. To understand Vision and Introduction to IoT. To Understand IoT Market perspective. To know the Data and Knowledge Management and use of Devices in IoT Technology. To Understand State of the Art – IoT Architecture. To understand the real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT. 					
	Modules Teaching Hours				
Module-I What is IoT: Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.					
Smart Objects: The "Thi Sensor Networks, Conne Access Technologies.	Module-II ings" in IoT, Sensors, Actuators, and Smart Objects, cting Smart Objects, Communications Criteria, IoT	11 Hours			

Module-III	
IP as the IoT Network Layer: The Business Case for IP, The need for	
Optimization, Optimizing IP for IoT, Profiles and Compliances, Application	10 Hours
Protocols for IoT, The Transport Layer, IoT Application Transport Methods.	
Module-IV	
Data and Analytics for IoT: An Introduction to Data Analytics for IoT,	
Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming	11 Hours
Analytics, Network Analytics, Securing IoT, A Brief History of OT Security,	
Common Challenges in OT Security, How IT and OT Security Practices and	
Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The	
Phased Application of Security in an Operational Environment	
Module-V	
IoT Physical Devices and Endpoints: Arduino UNO: Introduction to Arduino,	
Arduino UNO, Installing the Software, Fundamentals of Arduino	
Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction	
to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating	10 11
Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Dathan Windows Terrenerative Magitaring System Using Di DS18D20	10 Hours
Temperature Sensor Connecting Despherry Di via SSH Accessing	
Temperature Sensor, Connecting Raspberry P1 Via SSH, Accessing	
Connected Cities An IoT Strategy for Smarter Cities Smart City IoT	
Architecture	
Smart City Security Architecture, Smart City Use-Case Examples	
Question paper pattern:	
1. The question paper will have TEN questions.	
2. There will be TWO questions in each module, covering all the topics.	
3. The student need to answer FIVE full questions, selecting ONE full question	on from each
module.	
1 Devid Hones, Conzelo Selqueiro, Detrick Greesetete, Debert Derten, Jereme He	nru "IaT
L.David Halles, Golizalo Salguello, Fattick Glossetele, Kobert Baltoli, Jelolle He	at of
Things" 1 st Edition Degreen Education (Cisco Press Indian Penrint) (ISBN:078	
03868737/3)	-
2 Srinivasa K.G. "Internet of Things" CENGAGE Leaning India 2017	
Reference Books:	
1.Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approac	ch)",
1 st Édition, VPT, 2014. (ISBN:978-8173719547)	, ,
2.Raj Kamal, "Internet of Things: Architecture and Design Principles",	
1 st Edition, McGraw Hill Education, 2017. (ISBN:978-9352605224)	
Course outcomes:	
On completion of the course, the student will have the ability to:	

Course	CO #	Course Outcome (CO)
Code		
	CO1	Demonstrate the impact and challenges posed by IoT networks
		leading to new architectural models.
	CO2	Analyze the IoT Sensors, Actuators and Smart Objects for IoT
		access technologies.
	CO3	Propose the role of IoT protocols for efficient network
		communication.
	CO4	Apply the data science, machine learning techniques and security
		principles in IoT
	CO5	Design and implement real life applications using sensor
		technologies and IoT devices.

Web Application Security					
SubjectCode:19IS72Credit:03CIE:50					
Number ofLectureHours/Week	03	SEE:50			
TotalNumberofLectureHours52SEEHours:03					
Prerequisites: Computer Networks, Information Security					

CourseObjectives:To enable the students to understand Web Application Security in the following topics:

- The main objective is to understand the importance of Security.
- To discover and exploiting security flaws in web applications which are accessed using a web browser to communicate with a web server.
- To examine a wide variety of different technologies, such as databases, file systems, and web services, but only in the context in which these are employed by web applications.

MODULES	TeachingHours
Module I Web Application Insecurity And DefenceMechanism:The Evolution of Web Applications, Web Application Security, Key Problem Factors, Handling User Access, Handling User Input, Handling Attackers Web application technologies: HTTP Protocol, Web Functionality, Encoding Schemes,	11hrs
ModuleII Mapping application : Enumerating Content and functionality, Analyzing application, Attacking Authentication: Authentication technologies, design flaws in authentication, implementation flaws in authentication, securing authentication	10hrs
ModuleIII Attacking Session Management: The Need for state, Weaknesses in token generation, weaknesses in session token handling, securing session management. Attacking Access Controls: Common vulnerabilities, Attacking access controls, securing access controls.	10hrs

ModuleIV			
Attacking Da Injecting into I components: Interpreters, Ir	11hrs		
		Module V	
Attacking Ap Flaws, Ex.1 Fo Cheating on bu the login, avoi	plication Logic poling a passwor ulk discounts, Ex ding logic flaws	The Nature of Logic Flaws , Real – World Logic rd change function , Ex.2 Breaking the bank, Ex.3 x.4 Invalidating input validation, Ex.5 Racing against	10hrs
TEXTBOOK 1. Web A	: pplication Hack	er's Handbook, DafyddStutarf, Marcus Pinto, Wiley, 2nd	d Edition
REFERENCI 1. Hacking Ex	E BOOKS: posed Web App	lications, by JeolScambray, Vincent Liu and Caleb Sima	. 3 rd edition,
Courseoutco On completio	omes: n ofthecourse,tl	hestudentwillhavetheabilityto:	
Course Code	CO# CourseOutcome(CO)		
	CO1 Describe web-based applications and Technologies and associated threats		
	CO2 Analyze the application and authentication technologies and design, implement flaws in authentication		
	CO3 Evaluate web application security vulnerabilities Develop a security strategy and solution for securing web-based applications		
	CO4 Understand the role of web-based applications in E-commerce transactions Describe social networking and evaluate associated risks Identify web application security controls and risk mitigation techniques		
	CO5Assess web application security compliance requirements and objectivesDependenceweb – application Vulnerability and Security Assessment Test Plan		and objectives Design a Fest Plan

USER INTERFACE DESIGN		
Subject Code	19IS731	Credits:03
CIE:50	SEE:50	SEE: 03hours

	Total
Hours/Week:3hours(Theory)	
Prerequisite: The students should have the knowledge the Software Engineering Fund and Interface Building tools.	amentals
Course Objectives:	
To enable the students to obtain the knowledge of User Interface Design in the follow	ing topics.
• To analyze and model requirements and constraints for the purpose of designing implementing user interfaces for software applications.	g and
• To participate in a small team to design and implement a user interface, based or requirements specification.	on modeling
• To apply software and paper prototyping tools to design user interfaces that take into account human capabilities and constraints, users' needs, usability goals and user experience goals.	
• To implement functional or wizard-of-oz user interface prototypes based on the process and critically evaluate the usability of a small-to-medium-sized softwar application.	e design re
Modules	
	Hours
Module I	
Human Factors Of Interactive Software, Theories, Principles And Guidelines: Introduction, Goals of Systems Engineering, Goals of Interface Design, Motivation for Human Factors in Design, Accommodation of Human Diversity, Goals for the Profession, High Level Theories, Object-Action Interface Model, Principle 1:	
Recognize the Diversity, Principle 2: Use the Eight Golden Rules of Interface Design, Principle 3: Prevent Errors, Guidelines for Date Display.	8 Hours

Module II	
Management Issues: Introduction, Organizational Design to Support Usability, The Three Pillars of Design, Development Methodologies, Ethnographic Observation, Participatory Design, Scenario Development, Social Impact Statement for Early Design Review, Legal Issues. Expert reviews, usability testing and laboratories, surveys, acceptance tests, evaluation during activeuse	9 Hours
Tools and Environments: Introduction, Specification Methods, Interface-Building Tools, Evaluation and Critiquing Tools. Introduction, Examples of Direct- Manipulation Systems, Explanations of Direct Manipulation, Visual Thinking and Icons.	
Module III	
Menus, Forms, Dialog Boxes And Commands: Task Related Organization, Item Presentation Sequence, Response Time and Display Rate, Fast Movement through Menus, Menu Layout, Form Fill-in, Dialog Boxes. Functionality to support Users Tasks, Command-Organization Strategies,. The benefits structure, naming and abbreviations, command menus, Natural language in computing.	8 Hours
Module IV	
Interaction Devices And Response Time: Interaction Devices, Introduction, Keyboards and Function Keys, Pointing Devices, Speech Recognition, Digitization, and Generation, Image and video displays, printers, Presentation Styles, Manuals, Help, And Tutorials: Error Messages, Non-anthropomorphic Design ,Display design, color reading from paper versus from displays.	8 Hours
Module V	
Presentation Styles, Manuals, Help, And Tutorials Contd:	
Multiple-Window Strategies, Hypermedia And The World Wide Web :Preparation of Printed Manuals, Multiple-Window Strategies: Introduction, Individual-Window Design, Multiple- window Design, Co-ordination by Tightly Coupled Windows, Image Browsing and Tightly Coupled Windows.	9 Hours
Multiple-Window Strategies, Hypermedia And The World Wide Web contd.: Genres and Goals and Designers, Users and Their Tasks, Object-Action Interface Model for Web Site Design.	

- 1. The question paper will have TEN questions.
- 2. There will be TWO questions in each module, covering all the topics.
- 3. The student need to answer FIVE full questions, selecting ONE full question from each

module.

Text books:

1. **Designing the User Interface-** Ben Shneiderman, 3rdEdition,Addison-Wesley, 1998.

Reference Books:

- Human-Computer Interaction Alan J Dix et. al., 2ndEdition,Prentice-Hall, India,1998
- 2. User Interface Design Eberts, Prentice-Hall, 1994.
- 3. The Essential Guide to User Interface Design An Introduction to GUI Design– Wilber O Galitz, Principles and Techniques, Wiley-Dreamtech India Pvt. Ltd.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Describe the User interface design
	CO2	Identify the key aspects of Management
	CO3	Implement the Menus, Forms, Dialog Boxes
	CO4	Propose the Interactive devices to various applications.
	CO5	Apply the Presentation Styles, Manual, Multiple windows and World Wide Web in the user interface design

SOFTWARE ARCHITECUTRE		
Subject Code	19IS732	Credits:03
CIE:50	SEE:50	SEE: 03hours
Hours	s/Week: 3hours(Theory)	Total Hours:42
Prerequisite: The students sho architecture.	ould have the knowledge of software engineering ar	id computer
 Course Objectives: To enable the students to obtain the knowledge of Software Architecture and Design Patterns in the following topics. To perform the analyses necessary to formulate effective software architectures. To analyze Software engineering problems in terms of architectural thinking. To have a firm working grasp of the architectural concepts of platform, framework, pattern, Class Association Diagram and the use of 'objects in the N-Platform space'. 		
Modules Teaching		
Module I Introduction: what is a design pattern? Describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. What is object-oriented development? , key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm.		9 Hours

Module III Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, fly weight proxy.	8 Hours
Module IV Interactive systems and the MVC architecture: Introduction, The MVC architectural pattern, analyzing a simple drawing program , designing the system, designing of the subsystems, getting into implementation, implementing undo operation , drawing incomplete items, adding a new feature , pattern based solutions.	9 Hours
Module V Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web (discussions and further reading) a note on input and output, selection statements, loops arrays.	8 Hours
 Question paper pattern: 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all thetopics. 3. The student need to answer FIVE full questions, selecting ONE full question fr module. 	rom each
Text books: 1. Object-oriented analysis, design and implementation, brahma dathan, sarnathra universitiespress,2013	mmath,

2. Design patterns, erich gamma, Richard helan, Ralph johman , john vlissides, PEARSON

Publication,2013.

Reference Books:

- 1. Frank Bachmann, RegineMeunier, Hans Rohnert "Pattern Oriented Software Architecture" Volume1.
- 2. William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wile..

Course outcomes:

Course Code	CO #	Course Outcome (CO)	
	C01	Identify and utilize design patterns.	
	CO2	Analyze the functional requirements and defining conceptual classes and relationships	
	CO3	 O3 Practice core design principles and be able to assess the quality. O4 Analyze and design the principles to the object oriented systems 	
	CO4		
	CO5	Implementing range of design patterns and capable of comprehending a design and apply suitable patterns in specific contexts	

STORAGE AREA NETWORKS		
Subject Code	19IS733	Credits:03
CIE:50	SEE:50	SEE: 03hours
Hours/Week:3hours(Theory)		
Prerequisite: The students should have a basic knowledge of computer networks.		

Course Objectives: To enable the students to obtain the knowledge of Storage Area Networks in the following topics.

- To understand basics of storage area networks and network attached storage.
- To understand implementation of RAID, RAID impact on performance.
- To understand about direct attached storage (DAS) type benefits and limitations.
- To understand about content addressed storage (CAS) and storage virtualization.

Modules	Tooching
mounes	Hours
Madula I	110015
wiodule 1	
INTRODUCTION: Server Centric IT Architecture and its Limitations; Storage	
- Centric IT Architecture and its advantages; Case study: Replacing a server with	
Storage Networks; The Data Storage and Data Access problem; The Battle for size and	
access. INTELLIGENT DISK SUBSYSTEMS - 1: Architecture of Intelligent Disk Sub systems.	9 Hours
Module II	
Hard disks and Internal VO Channels, JBOD, Storage virtualization using RAID and	
different RAID levels; INTELLIGENT DISK SUBSYSTEMS - 1, I/O TECHNIQUES	
- 1: Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems;	
Availability of disk subsystems. The Physical VO path from the CPU to the Storage	8 Hours
System; SCSI.	
Module III	
I/OTECHNIQUES-2,NETWORKATTACHEDSTORAGE:FibreChannel	
Protocol Stack; Fibre Channel SAN; IP Storage. The NAS Architecture The NAS	
hardware Architecture, The NAS Software Architecture, Network	8 Hours
connectivity, NAS as a storage system	
Module IV	
FILE SYSTEM AND NAS: Local File Systems; Network file Systems and file servers;	0.44
Shared Disk file systems; Comparison of fiber Channel and NAS.	8 Hours
Module V	
STORAGE VIRTUALIZATION: Definition of Storage virtualization;	
Implementation Considerations; Storage virtualization on Block or file level; Storage	0 Hours
virtualization on various levels of the storage Network; Symmetric and Asymmetric	9 HOURS
storage virtualization in the Network.	

Course outcomes:

On completion of the course, the student will have the ability to:

Question paper pattern:

1. The question paper will have TENquestions.

2. There will be TWO questions in each module, covering all thetopics.

3. ThestudentneedtoanswerFIVEfullquestions, selectingONEfullquestionfromeach module. **Text books:**

1. **Storage Networks Explained** - Ulf Troppens, Rainer Erkens and Wolfgang Muller, Wiley India, 2003

2. Storage Networks, The Complete Reference - Robert Spalding, Tata McGraw Hill, 2003.

Reference Books:

Reference Books: 1. Storage Area Network Essentials A Complete Guide to Understanding and Implementing SANs - Richard Barker and Paul Massiglia, Wiley India, 2002.

2. Storage Networking Fundamentals - Marc Farley, Cisco Press, 2005.

Course Code	CO #	Course Outcome (CO)
		Demonstrate the architecture, limitations and data
	CO1	access techniques in SAN.
	CO2	Identify Intelligent Disk Subsystems, JBOD, Storage Virtualization using RAID & RAID Levels
	CO3	Demonstrate the working principles of NAS
	CO4	Illustrate File System and Network Attached Storage Systems
	CO5	Describe Storage Virtualization on Various levels of Storage Network

	MACHINE LEARNING		
Subject Code	19IS741	Credits:03	
CIE:50	SEE:50	SEE: 03hours	
Hours/Week: 3 hours(Theory)		Total Hours:42	

Prerequisite: Students should have basic knowledge of algebra, discrete math and statistics.

Course Objectives:

To enable the students to obtain the knowledge of Machine Learning in the following topics.

- To introduce students to the basic concepts and techniques of machinelearning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study and research.

Modules	Teaching Hours
Module-I Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias	8 Hours
Module-II Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning	8 Hours
Module-III Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm.	8 Hours

		Module-IV		
Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm			9 Hours	
		Module-V		
 Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Reinforcement Learning: Introduction, Learning Task, Q Learning 			9 Hours	
Question paper patte	ern:			
1. The question p	aper will ha	ve TENquestions.		
2. There will be T	WO questio	ons in each module, covering all thetopics.		
3 Thestudentnee	- dtoanswerFI	VEfullquestions selecting ONE fullquestion from each mo	dule	
5. Thestudentilee	utoanswerr	v Erunquestions, selecting of vErunquestion from each mo	uuic.	
Text books: 1.Tom M. Mitchell, "	Machine Lea	arning", McGraw-Hill Education (INDIAN EDITION), 2	.013.	
Reference Books:				
1.EthemAlpaydin, "Ir	troduction t	o Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd.,20	013	
2.T. Hastie, R. Tibshi edition, 2001	rani, J. H. Fi	riedman, "The Elements of Statistical Learning", Springe	r;1st	
e-Books:	ac il/~shais/	Understanding Machine Learning/understanding_ machine	learning_theory_	
algorithms.pdf	ac.11/~sitats/	Understanding Waenmelea ming/ understanding- maenme	icaning-meory-	
2. <u>http://alex.smola.org</u>	<u>g/drafts/theb</u>	<u>ook.pdf</u>		
1. <u>https://www.course</u>	1. https://www.coursera.org/learn/machine-learning			
2. https://www.udacity.com/course/intro-to-machine-learningud120				
3. Introduction to Machine Learning - Course https://onlinecourses.nptel.ac.in/noc22_cs29				
Course outcomes: On completion of the course, the student will have the ability to:				
Course Code	CO #	Course Outcome (CO)		
	CO1	Demonstrate the designing of a learning system and issulearning	ues in machine	
	CO2	Apply decision tree learning to solve machine learning p	oroblems	

CO3	Apply neural network techniques to solve complex problems
CO4	Analyse Bayesian learning techniques for predicting probabilities
CO5	Analyse and evaluate the hypothesis accuracy using sampling and probability theory

REAL TIME SYSTEMS			
Subject Code	19IS742	Credits:03	
CIE:50	SEE:50	SEE: 03hours	
Hou	Hours/Week: 3hours (Theory) Total Hours:42		
Prerequisite : The students Should have knowledge about basics of embedded system and operating system.			
 Course Objectives: To enable the students to obtain the knowledge of Real Time Systems in the following topics. To understand real time systems and relate it to embedded systems. To understand the kernel construction ,real time scheduling and schedulability analysis. To understand the control of asynchronous processes, deadlocks, memory 			
• To compare performance of various real time systems its queuing methods and reliability			
	Modules	Teaching Hours	

Module I	
Basic Real Time Concept: Basic Computer, Architecture-Bus transfer mechanism, Input and Output, Memory, CPU operations: Some terminology – Software concepts, System concepts, Real-Time definitions, Events and Determinism, Synchronous and Asynchronous events, Determinism, Time Loading; Real-Time Design issues; Examples Real-Time systems; Brief history- software ,Hardware. Real-Time Specification and Design Techniques: Natural Languages; Mathematical Specifications; Flowcharts; Structure Charts; Pseudo code and programming Design Languages; Finite state Automata; Data flow diagrams- De Marco's Rules, Hatley and Pribhai's extensions; Petri nets; Warnier-Orr notations- Indexed Loop; State charts- Depth, Orthogonality, Broadcast communication; Sanity in Graphical Techniques.	9 Hours
Module II Real-Time Kernels: Polled Loop System- Polled loop with interrupts; phase/State- Driven code; Coroutines; Interrupt-Driven Systems - Context switching, Round Robin System, Preemptive priority systems, Major and Minor Cycles, Hybrid Systems; Foreground/Background systems- Background processing, Inialization, Real-time operation; Full-Featured Real-Time operating system- Task-control Block model; Build or Buy? POSIX. Intertask Communication And Synchronization: Buffering Data- Time-Relative buffering, Ring Buffers; Mailboxes- Mailbox Implementation, Other operations on Mailboxes, Queues; Critical Regions; Semaphores – Mailboxes and Semaphores, Problems with Semaphores, The Test-and- Set Instruction; Event Flags and Signals; Deadlock - Avoidance, detect and Recover.	9 Hours
Module III Real-Time Memory Management: Process Stack Management – Task- Control Block model, Managing the Stack, Run-Time Ring Buffer, Maximum Stack size, Multiple stack arrangements, Task-Control Block Model; Dynamic Allocation- Swapping, Overlays, MFT, MVT, Demand Paging, Working Sets, Real Time garbage Collection, Contiguous file systems; Static Schemes.	8 Hours
Module IV System Performance Analysis and Optimization: Response-Time Calculation- Polled Loops, Coroutines /Phase-Driven Code, Interrupt System; Interrupt Latency - Propagation Delay, Macroinstruction Execution Times, Interrupts disabled, Preemption, Low Priority Interrupts high; Time- Loading and its Measurement – Using logic analyzer, Instruction Counting, Pictorial representation, Instruction execution time simulators, Deterministic performance; Scheduling is NP-Complete; Reducing response times and time loading – Compute at slowest cycle, Scaled Arithmetic, Binary angular measurement, Look-up tables.	8 Hours

Module V	
Queuing Models: Probability functions - Continuous; Discrete; Basic buffer Size calculation – handling Bursts of data, Variable Buffer size calculation, Classical Queuing Theory – The M/M/1 Queue, service a d production rates, More buffer calculations, Response - Time Modeling, Other queuing models; Little's Law; Erlang's Formula. Reliability, Testing and Fault Tolerance : Faults, Failures, Bugs and Effects; Reliability - Formal definition, Calculating System reliability; Testing– Unit level testing, System level testing, Statistically based testing, Cleanroom testing, stress testing; Fault Tolerance – General problems handling, N-Version Programming, Built-In-Test Software, CPU Testing, Memory Testing, Spurious and Missed Interrupts, Dealing with Bit Failures.	8 Hours
Question paper pattern:	
1. The question paper will have TEN questions.	
2. There will be TWO questions in each module, covering all the topics.	
3. The student need to answer FIVE full questions, selecting ONE full question from each module.	
Text books:	
1."Embedded systems Architecture; Programming and design"; RajKamal Tata Mo Second edition.	cGraw-Hill;
2."Real-Time Systems Design AndAnalysis", Phillip A. Laplante, Third Edition, 2004 Willey-IEEE Press.	
Reference Books:	
1."Real Time Systems", C.M.Krishna; KangG.shin, McGraw-Hill.	

2."An Embedded software primer", David Simon, Addison Wesley,2000

3."Micro Controller : Architecture, Programming, Interfacing and System Design", Rajkamal, Pearson Education.

4."AnIntroductionToRealTimeSystems",RaymondJ.A.Buhr,DonaldL.Bailey,Prentice Hall International. "The 8051 Microcontroller and Embedded system",Mohammed Ali mazidi; Janice GillispiedMazidi;;Pearson Education Asia2002. **Course outcomes:**

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Classify the issues that arise in designing soft and hard real- time, concurrent, reactive, safety-critical and embedded systems.
	CO2	Demonstrate the functions of real time kernel.
	CO3	Illustrate the real time memory management issues.
	CO4	Analyze the system performance and optimization techniques.
	CO5	Demonstrate the fault tolerance issues, its effects and levels of testing

MOBILE ADHOC NETWORK

Subject Code	19IS743	Credits:03
		SEE:
CIE:50	SEE:50	03hours
		Total
	Hours/Week:3hours(Theory)	Hours:42

Prerequisite: The students should have the basic knowledge of wired networks includes different protocols, Mac protocols, routing protocols and standards.

Course Objectives :To enable the students to obtain the knowledge of Adhoc Networks in the following topics.

- To analyze the various design issues and challenges in the layered architecture of Ad hoc wireless networks.
- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs), Wireless LANs (WLANs) and Wireless Sensor Networks

WSNs).

• To expose students to emerging technologies and their potential impact

Modules	Teaching
	Hours

Module I	
INTRODUCTION: Ad hoc Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless internet. MAC : MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols with reservation mechanisms.	9 Hours
Module II	
MAC Contd.: Contention-based MAC protocols with scheduling mechanism, MAC protocols that use directional antennas, other MAC protocols. ROUTING : Routing protocols for Ad hoc wireless Networks: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table driven routing protocol, On- demand routing protocol.	8 Hours
Module III	
ROUTING Contd.: Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols. TRANSPORT LAYER: Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of Transport layer solutions	9 Hours
Module IV	
SECURITY: Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues and challenges in security provisioning. Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.	8 Hours
Module V	
QoS: Quality of service in Adhoc wireless Networks: Introduction, Issues and challenges in providing QoS in Adhocwireless Networks, Classification of QoS solutions, MAC layer solutions, Network layer solutions.	8 Hours

1. The question paper will have TEN questions.

2. There will be TWO questions in each module, covering all the topics.

3. The student need to answer FIVE full questions, selecting ONE full question from each module.

Text books:

1.Ad hoc Wireless Networks – C. Siva Ram Murthy & B. S. Manoj, 2ndEdition, Pearson Education, 2005.

Reference Books:

1. Ad hoc Wireless Networks– Ozan K. Tonguz and Gianguigi Ferrari, John Wiley, 2006.

2. AdhocWirelessNetworking–XiuzhenCheng,XiaoHung,Ding-ZhuDu,Kluwer Academic Publishers,2004

3. Adhoc Mobile Wireless Networks - C.K. Toh, Protocols and Systems, Prentice- HallPTR, 2002.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Interpret the different design issues and classification of MAC protocols
	CO2	Demonstrate the design issues and classification of Routing protocols.
	CO3	Demonstrate the design principles and issues of Transfer Layer Protocol
	CO4	Interpret the network security principles, attacks and key management issues.
	CO5	Propose the issues in QoS solutions and Energy Management Schemes in Ad-Hoc Wireless Networks.

DATA AI	NALYTICS USING PYTHON			
Subject Code	19IS7OE	Cre	edits:03	
CIE:50	SEE:50	SEE:	03hours	
I		To	tal	
Hours/Week:3ho	urs(Theory)	Hours:4	2hours	
Prerequisite: The Students should have	the thorough knowledge of any Data	Base and	programming	
principles.				
 Course Objectives: To enable the stude Understand the Data Pre-proce Understand and applydifferent Classification Understand and apply Cluster Understand the Python progra Apply the Data Mining technic 	ents to essing activities and multidimensiona t algorithms to perform Association F Analysis Algorithms mming principles to perform analysis gues in real life applications	ıl data repre tule Mining s.	esentation. g and	
Apply the Data Mining techniques in real life applications. Modules Teac			Teaching	
			Hours	
Module I Introduction : What is Data Warehouse? Need of Data Warehouse, Data Preprocessing, Why preprocess the data, Data Cleaning, Missing Values, Noisy Data, Data Integration and Transformation, Data Reduction Data Warehouse and OLAP Technology : Difference between operational data base and data warehouse, Multi-dimensional Data Model, Stars, Snowflake and Fact Constellations: Schemas for Multidimensional Data bases, Defining Star, Snowflake and Fact constellation schemas, Concept Hierarchies, OLAP operations in Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse			y	
M	odule II		8	
Mining Frequent Patterns, Association and Correlations : Frequent Item sets, Closed Item sets and Association Rules, The Apriori Algorithm finding frequent itemsets using Candidate Generation, Generating Association Rules from Frequent Item Sets, Improving the efficiency of Apriori, Mining Frequent Itemset Without Candidate Generation, FP-Growth Algorithm, Mining Frequent Itemset using Vertical Data Format, Mining Closed Frequent Itemset.				
Module III Classification: Preliminaries; general Approach to solving a classification problem; Decision tree induction; Python Programming Language- About Python, Python development environment, Programming fundamental concepts, Identifiers, Reserved Words, Lines and Indentions, Multi-Line Statements, Command Line Arguments, Variable Types,			9	
imbers and strings.				

Cluster Analysis: Overview Operators, Arithmetic Op Operator, Logical Operat loop statements. Lists, B Built-in-tuples.	N y; K-means Agg perator, Comp or and Assign uilt-in-List, Fu	Iodule IV glomerative hierarchical clustering, DBSCAN, arison Operator, Assignment Operator, Bitwise ment Operator, Decision Making Statements, anctions and Methods, Functions in lists. Tuples,	8
	Ţ	Module V	8
Object oriented prog Polymorphism.	ramming, C	lass declaration, Encapsulation, Inheritance,	0
Question paper pattern The question paper will h	: have ten quest	ions.	
There will be 2 questions The students will have to	from each me answer 5 full	odule, covering all the topics from a module. questions, selecting one full question from each	module.
Text Books 1. Introduction to Data Mir Pearson Education,2007	ing-Pang –Nin	g-Tan,MichaelSteinbach,Vipin Kumar	
2.Data Mining-Concepts ar	d Techniques-	Jiawei Han and Micheline Kamber, 2 nd	
3. Charles Dierbach, Intr Solving Focus, Wiley Ind	,2006 oduction to Co lia Edition	omputer Science using PYTHON - A Computation	onal Problem -
Reference Books:			
1.Insight into Data Mining- 2006	Theory and pra	actice- K.P.Soman,ShyamDiwakar,V.Ajay,PHI,	
2. Reference Books: 1. F Python Programmin	Kenneth A. La ng", Cengage	mbert , B.L Juneja , "Fundamentals of Learning,ISBN:978- 81-315-2903-4, 2015	
Course outcomes: On completion of the co	ourse, the stu	dent will have the ability to:	
Course Code	CO #	Course Outcome (CO)	
	CO1	Demonstrate the data preprocessing techniques and models	data ware house

CO2	Analyze the different approaches for mining frequent patterns, associations and Correlations.
CO3	Apply various algorithms for classification techniques using Python programming principles
CO4	Apply different algorithmic approach for cluster analysis using Python Program
CO5	Implement data mining application using Python

INTERNET OF THINGS LAB				
Subject Code	19ISL71	Credits:01		
CIE:50	SEE:50	SEE: 03hours		
Hours/Week:2ho	ours(Practical)	Total Hours:14hours		
Prerequisite: The students should have the networking, automation and UI/UX designation and UI/UX designation.	ne thorough knowledge of hardware inte gn.	erfacing, IP		
Course Objectives:				
 To enable the students to obtain the knowledge of Internet of things Lab in the following topics. To focus on research –Design and development of IoT enabled technologies which are cost effective and socially relevant. To develop trained manpower (through student projects/research) in the field of IoT based application development. 				
1.Study and Install IDE of Ardu	ino and different types of Arduino			
2. Write program using Arduinc	DIDE for Blink LED.			
3. Write program using Arduino IDE for Controlling an Led with Push Button				
4. Write program using Arduino IDE to Toggle LED using Push Button.				
5. Write program using Arduino IDE to Control of Lights using LDR Sensor				
6.Write program to measure the soil moisture using soil moisture sensor.				
7. Write program to calculate the temperature and Humidity.				

- 8. Write a program using Arduino IDE to connect buzzer and beep.
- 9. Write a program using Arduino IDE to connect servo motor and rotate it 180° .
- 10. Write a program to interface Seven Segment Display to Arduino IDE and display from 0 to 9.

Question paper pattern: In SEE, students will be asked to execute one program which may be related to the above list of programs.

Reference Books:Lab Manual

Course outcomes:						
On completi	on of th	e course, the student will have the ability to:				
Course	CO # Course Outcome (CO)					
Code	Code					
CO1 nonstrate the concepts of Internet of thing		nonstrate the concepts of Internet of thing				
CO2 hibit the skills of performing experimental tasks related to Internet order to generate the necessary output		nibit the skills of performing experimental tasks related to Internet of things in order to generate the necessary output				
CO3 To share the responsibility and contribute as a member of a team		To share the responsibility and contribute as a member of a team				
CO4 lyze the data and interpret data to take valid decisions		lyze the data and interpret data to take valid decisions				
CO5 pare report about the experimental work		pare report about the experimental work				

	SEMINAR	
Subject Code	19ISS1	Credits:01
CIE:50	SEE:	Total hours: 14 hrs
Prerequisite: The Students should have the knowledge of current technologies, Creativity and programming skills.		

Course Objectives:

- To understand the current trends in the industries
- To apply the documentation techniques.
- To exhibit the presentation skills and interactive skills.
- To apply the analysis skills.

	Modules	Teaching		
		Hours		
SE	MINAR COMPRISES OF:			
-	Technical survey – identifying the recent development in the modern technology			
-	Technical requirement – identifying the current industrial skills			
-	Co-related technologies – identifying the co-related technologies	14 Hours		
-	Report generation – preparing the IEEE standard documents of the same.			
Sen app sen	Seminar document contains Abstract, introduction, problem formulation, design and application based on the above factors. Document should be submitted in the mid of semester.			
Sen	Seminar will be evaluated for 1 credit by means of presentation.			
Co	Course outcomes:			
On	On completion of the course, the student will have the ability to:			

Course Code	CO #	Course Outcome (CO)
	CO1	To demonstrate the different surveys to understand the current industrial requirements.
	CO2	To analyze different technical requirements and demonstrate interactive skills.
	CO3	To demonstrate the presentation skills.

CO4		To demonstrate the analytical skills.
	CO5	To examine the intensity of the interactive sessions.

PROJECT WORK PHASE - 1				
Subject Code	19ISP1	Credits:0		
CIE:50	SEE:50	SEE: 03hours		
Prerequisite: The students should have Thorough knowle	edge of Software Engineering	g and		
Mastering any one programming language.				
Course Objectives:				
• To understand the current requirement of the In	ndustries.			
• To understand the different software development and testing methodologies.				
• To understand and apply architectural model, data flow and control flow diagrams.				
• To acquire good documentation, demonstration society	n skills and impact of applica	ation on		
Project Phase – I comprises of:		Teaching Hours		

1.	Literature Survey			
2.	Requirement Analysis			
	- S/w Requirements			
	- H/w Requirements	5		
3.	Design Module pres	sentation		
4.	Application			
5.	System Requirement Specification document SRS document contains synopsis, problem formulation and requirement analysis based on above factors. Document should be submitted by the end of VII Sem. Project Phase-I would be evaluated for 2 credits by means of presentation.			
Co	Course outcomes:			
Or	On completion of the course, the student will have the ability to:			
	Course Code CO # Course Outcome (C		Course Outcome (CO))

Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the skills of performing surveys on current industrial requirements.
	CO2	Analyze the requirements and apply appropriate software development methodology.
	CO3	Implement and Validate the architectural model, data flow and control flow structures.
	CO4	Demonstrate the documentation and presentation skills
	CO5	Implement the Societal and Ethical systems.

EIGHTH SEMESTER

	VIRTUAL REALITY AND AUGMENTED REALITY		
Subject Code 19IS81			
		SEE:	
CIE:50	SEE:50	03hours	
	Hours/Week:4hours	Hours:42	
Prerequisite: The studen graphics with open GL a	nts should have the good knowledge of C# programming, on nd real time 3D concepts.	computer	
 Reality in the following to To understand op developing VR/A web-based) contered to the total optical developing and approach. 	topics. portunities and the main issues related to designing and R systems architectures, both in local and in distributed (exts. velopment of VR/AR applications with a multimodal pers	ven pective	
Modules			
	Module I		
 Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three dimensional position trackers, navigation and manipulation, interfaces and 			
gesture interfaces.	Module II		
Output Devices: Graphics displays, sound displays & haptic feedback.			
	Module III		
Modeling: Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management.			
	Module IV		
Human Factors: Methodology and terminology, user performance studies, VR 8 health and safety issues. 8			

Module V	
Applications: Medical applications, military applications, robotics applications.	9 Hours

1. The question paper will have TEN questions.

2. There will be TWO questions in each module, covering all the topics.

3. The student need to answer FIVE full questions, selecting ONE full question from each module.

Text books:

1. Augmented Reality: A Practical Guide by Stephen Cawood and Mark Fiala.

2. Augmented Reality Principles and Practices by Dieter SchmalstiegandTobias Hollerer.

Reference Books:

1. Understanding Virtual Reality, interface, Application and Design, William R. Sherman, Alan Craig, Elsevier (Morgan Kaufmann).

- 2. 3D Modeling and surfacing, Bill Fleming, Elsevier (Morgan Kauffman).
- 3. 3D Game Engine Design, David H.Eberly, Elsevier.
- 4. Virtual Reality Systems, John Vince, Pearson Education.
- 5. What is Virtual Reality? <u>http://vr.isdale.com/WhatIsVR/frames/WhatIsVR4.1.html</u>.

6. Augmented and Mixed Reality, http://www.mic.atr.co.jp/~poup/research/ar/.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Describe the components of the virtual reality system
	CO2	Describe various input and output devices used for virtual reality
	CO3	Apply the different modeling concepts to visual virtualization
	CO4	Analyze the performance of given simple applications related to virtual reality
	CO5	Design 3D technology with virtual programming concepts in different applications.

BIG DATA ANALYTICS		
Subject Code	19IS821	Credits:03
CIE:50	SEE:50	SEE: 03hours
Hours/Week:	3hours(Theory)	Total Hours:42hours
Prerequisite: The students should have t	the knowledge of DBMS	
 Course Objectives: To enable the students to obtain the knowledge of Big Data Analytics in the following topics. To explore the fundamental concepts of big data analytics. To learn to analyze the big data using intelligent techniques. To understand the applications using Map Reduce Concepts. To introduce programming tools PIG & HIVE in Hadoop echo system 		
Mo	dules	Teaching Hours
 Module I INTRODUCTION TO BIG DATA Types of Digital Data, Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, What is Big Data?: Volume, velocity, variety, Other characteristics of Data Which are not Definitional Traits of Big Data: Why Big Data? Are we just an information consumer or do we also produce information?: Traditional business intelligence (B1) versus Big data: A typical data warehouse environment:, A typical hadoop environment:, What is new today?:, Coexistence of Big data and data warehouse, What is changing in the realms of Big data? Big Data Analytics What is big data analytics? What is big data analytics Isn't? Classification Analytics, Gratest challenges that prevent business for Capitalizing on Big Data, Top challenges facing Big data, What kind of technologies are we looking toward to help meet the challenges posed by big data ?. 		
Module II THE BIG DATA TECHNOLOGY LA NoSQL(Not Only SQL),Where is it used Why NoSQL?, Advantages of NoSQL NoSQL in Industry,NoSQLVendors,SQI SQL, NoSQL, and NewSQL, HADOOH Hadoop, Version of Hadoop, Overv Distributions, Hadoop versus SQL, Integ Market Vendors, Cloud-Based Hadoop S	NDSCAPE ?, What is it?, Types of NoSQL Databases, , What We Miss With NoSQL?, Use of L versus NoSQL,New SQL, Comparison of P: Features of Hadoop, Key Advantages of riew of Hadoop Ecosysytems, Hadoop grated Hadoop Systems Offered by Leading Solutions,	9 Hours

INTRODUCTION TO HADOOP

Introducing Hadoop, Data: The Treasure Trove, Why Hadoop?, Why not RDBMS?, RDBMS versus Hadoop,, Distributed Computing Challenges, Hardware Failure, How to process this Gigantic store of data?, History of Hadoop, The name "Hadoop" Hadoop Overview, key aspects of Hadoop, Hadoop Components, Hadoop Conceptual Layer, High-level Architecture of Hadoop, use case of Hadoop, Clickstream Data, Hadoop Distributors, HDFS:Hadoop Distributed File System), HDFS Daemons, Anatomy of file read, Anatomy of file write, Replica placement strategy, working with HDFS Commands, Special features of HDFS, processing Data with hadoop, MapReduce Daemons, How does MapReduce work?, MapReduce Example, Managing Resources and applications with Hadoop YARN (Yet Another Resource Negotiator), Limitations of Hadoop 1.0 Architecture, HDFS Limitation, Hadoop 2:HDFS, Hadoop2 YARN: Taking Hadoop beyond Batch, Interacting with Hadoop Ecosystem, pig, Hive, Sqoop, Hbase.

Module III

INTORDUCTION TO MongoDB

What is Mongo DB?, Why Mongo DB?, Using Java Script Object Notation(JSON), Creating or generation a unique key, support for dynamic queries, storing binary data, replication, sharding, updating information in-place, terms used in RDBMS and MongoDB, create database, drop database, data types in MongoDB, MongoDB Query language, insert method, save() method, Adding a new field to an existing document – update method, removing an existing field from an existing document,remove method, finding documents based on search criteria-find method, dealing with NULL values, count, Limit, Sort, and skip, Arrays , Aggregate Function, MapReduce Function, Java Script Programming, Cursors in MongoDB, Indexes, Mongo Import, Mongo Export, Automatic Generation of unique numbers for the "id" field.

9 Hours

INTRODUCTION TO CASSANDRA

Apache Cassandra, An introduction, Features of Cassandra, Peer-to-peer network, gossip and failure detection, partitioner, Replication Factor, Anti-Entropy and Read Repair, Writes in Cassandra, Hinted handoffs, tunable consistency, CQL Data types, CQLSH, Logging into cqlsh, keyspaces, CRUD(Create, Read, Update, and Delete) Operations, collections, Set collection, list collection, Map collection, More practice on Collections(SET and LIST), Using Map:Key, value pair, using a counter, time to live (TTL), Alter commands, Alter table to change the data type of a column, alter table to delete a column, drop a table, drop a database, import and export, export to CSV, Import from CSV, Import from STDIN, Export to STDOUT, Querying system Tables , Practice examples

Module IV

INTRODUCTION TO MAPREDUCE PROGRAMMING

Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression. **INTRODUCTION TO HIVE:** What is Hive? History of Hive and recent releases of Hive, Hive features, Hive Integration and work flow, Hive data units, Hive

Architecture, Hive Data Types, Primitive Data Types, Collection Data Types, Hive

 File Format, Text file, Sequential File, Rcfile (Record Columnar File), Hive Query Language(HQL), DDL (Date Definition Language) Statements, DML(Data Manipulation Language) Statements, starting Hive shell, Database, Tables, Partitions, Bucketing, Views, Sub-query, Joins, Aggregation, Group By and Having, RCfile Implementation, SerDe, User-Defined Function(UDF). INTRODUCTION TO PIG what is pig?, Key geatures of pig, The Anatomy of pig, pig on Hadoop, Pig philosophy, Use case for Piog:ETL Processing, Pig latin overview, pig latin statements, pig latin:keywords, pig latin: Identifiers, Pig latin: Comments, Pig Latin:Case sensitivity, Operators in pig latin, Data types in Pig, Simple data types, complex data types, Running pig, Interactive mode, batch mode, Execution modes of Pig laced Made manual Made UDES Commende 	8 Hours	
Module V Relational Operators in PIG FILTER, FOREACH, GROUP, DISTINCT, LIMIT, ORDER BY, JOIN, UNION, SPLIT, SAMPLE, Eval function: AVG, MAX,COUNT, Complex Data Types:TUPLE, MAP,Piggy bank, user-defined functions(UDF), Parameter Substitution, Diagnostic Operator, Word Count Example using Pig, When to use Pig?, When not to use Pig?, Pig at Yahoo, Pig versus Hive. INTRODUCTION TO MACHINE LEARNING Introduction to machine learning, Machine learning definition, machine learning algorithms, regression model – linear regression, clustering, collaborative filtering, Association Rule mining, Decision Tree. CASE STUDIES PNUTS: Yahoo!'s hosted data serving platform. Finding a Needle in a haystack: Face book's photo storage	8 Hours	
 Question paper pattern: 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all the topics. 3. The student need to answer FIVE full questions, selecting ONE full question from 	each module.	
Text books: Big data and Analytics: Seema Acharya(Infosys ltd), Subhashini hellannan(Infosys ltd)	1)	
Big data and Analytics:Seema Acharya(mosys itd), Subnashini heliappan(mosys itd) Reference Books: 1. Noreen Burlingame, The little book on Big Data,New Street publisher(eBook) http://www.prlog.org/11800911-just-published-the-little-book-of-big-data-2012- edition.html 2. Norman Matloff ,The Art of R Programming: A Tour of Statistical Software Design , ISBN-13: 978-1-59327-384-2; ISBN-10: 1-59327-384-3 3. http://www.johndcook.com/R_language_for_programmers.html 4. http://bigdatauniversity.com/ 5. http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction		
Course outcomes: On completion of the course, the student will have the ability to:		

Course Code	CO #	Course Outcome (CO)
	CO1	Illustrate Big-data fundamentals and challenges in big
		data analytics.
	CO2	Demonstrate Hadoop, NOSQL frameworks to efficiently
		store retrieve and process Big Data.
	CO3	Apply big data programming to manipulate, store, and
		analyze the data.
	CO4	Illustrate Hive and Pig features, its architecture and data
		format for DDL and DML operations.
	CO5	Apply statistical analysis for machine learning
		algorithms.

DIGITAL IMAGE PROCESSING		
Subject Code 19IS822		Credits:03
CIE:50	SEE:50	SEE: 03hours
Hours/Week:3hours(Theory) Total Hours:42		
Prerequisite: The students	s should have the knowledge of Engineering Mathematics	
Course Objectives:		
To enable the students to obtain the knowledge of Digital Image Processing in the following topics.		
• To study the image fundamentals and mathematical transforms necessary for image processing.		
• To understand the image enhancement techniques		
• To study image restoration procedures.		
• To study the image compression procedures.		
Modules Teac Hou		Teaching Hours

	Module I			
	Digitized Image And Its Properties : Basic concepts, Image digitization, Digitimage properties. Image Preprocessing: Image pre-processing: Brightness a geometric transformations, local processing.	ital Ind	8 Hou	rs
	Module II			
	Segmentation: Thresholding, Edge-based segmentation. Region based segmentation, Matching.		8 Hou	rs
	Module III			
 Image Enhancement: Image enhancement in the spatial domain: Background, Some basic gray level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Image enhancement in the frequency domain: Background, Introduction to the Fourier transform and the frequency domain, Smoothing frequency domain filters, sharpening frequency domain filters, Homorphic filtering. 		Hours		
	Module IV			
Image Compression: Image compression: Fundamentals, Image compression 9 models, Elements of information theory, Error-Free Compression, Lossy 9		Hours		
	Module V			
Shape Representation: Region identification, Contour-based shape representation and description,. Shape classes.8		Hours		
Q	uestion paper pattern:			
1.	The question paper will have TEN questions.			
2.	There will be TWO questions in each module, covering all the topics.			
3. m 4.	The student need to answer FIVE full questions, selecting ONE full question from odule.	ı eac	ch	

Text books:

- **1. Image Processing, Analysis and MachineVision-**MilanSonka, VaclavHlavacand Roger Boyle, 2 ndEdition, Thomoson Learning,2001.
- **2.** Digital Image Processing Rafel C Gonzalez and Richard E Woods, 2ndEdition, Pearson Education,2003.

Reference Books:

- **1. Fundamentals of Digital Image Processing -** Anil K Jain, Pearson Education/Prentice-Hall of India Pvt. Ltd.,1997.
- 2. DigitalImageProcessingandAnalysis-B.Chanda,DDuttaMajumder,Prentice-Hall, India,2002.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the concepts of a digital image properties and preprocessing techniques
	CO2	Interpret different image segmentation techniques
	CO3	Apply different techniques for image enhancement and analysis
	CO4	Categorize various Image compression techniques
	CO5	Interpret image representation techniques

	GAME THEORY	
Subject	19IS823	Credits:03
Code	SEE.50	
CIE:50	SEE.30	SEE: 03hours
		Total
Hours/Week:3hours(Theor	Hours:42hours	
Prerequisite: None	y)	
•		
Course Objectives:		
To enable the students to obtain the know	ledge of Game Theory in the following topics	
• To explore the fundamental conce	pts of Game Theory.	
• To learn & analyze the mixed stra	tegy equilibrium, extensive games etc.	
• To understand the Bayesian Game	concepts. Strictly Competitive Games	
	concepts, bureay competitive cames.	
M	odules	Teaching
		Hours
M	odule I	
Introduction, Strategic Games: What is gam	e theory? The theory of rational choice; Examples: The prisoner's dilemma Bach or	
Stravinsky, Matching pennies; Nash equilibriu	m; Examples of Nash equilibrium; Bestresponse	
functions; Dominated actions; Equilibrium in a symmetric equilibria.	a single population: symmetric games and	
Mixed Strategy Equilibrium: Introduction; S	trategic games in which players may randomize;	9 Hours
Mixed strategy Nash equilibrium; Dominated a allowed Illustration; Expert Diagnosis; Equili	actions; Pure equilibria when randomization is	
Reporting a crime; The formation of players" beliefs; Extensions; Representing preferences by		
expected payoffs.		

	·
Module II	
Extensive Games : Extensive games with perfect information; Strategies and outcomes; Nash equilibrium; Subgame perfect equilibrium; Finding subgame perfect equilibria of finite horizon games: Backward induction. Illustrations: The ultimatum game, Stackelberg's model of duopoly, Buying votes, Extensions and Discussions: Extensions: Allowing for simultaneous moves, Illustrations: Entry in to a monopolized industry, Electoral competition with strategic voters, Committee decision making, Exit from a declining industry;	9 Hours
Module III	
Bayesian Games, Extensive Games with Imperfect Information: Motivational examples; General definitions; Two examples concerning information; Illustrations: Cournot''s duopoly game with imperfect information, Providing a public good, Auctions; Auctions with an arbitrary distribution of valuations. Extensive games with imperfect information; Strategies; Nash equilibrium; Beliefs and sequential equilibrium; Signaling games; Illustration: Strategic information transmission.	8 Hours
Module IV	
Strictly Competitive Games, Evolutionary Equilibrium : Strictly competitive games and maximization; Maximization and Nash equilibrium; Strictly competitive games; Maximization and Nash equilibrium in strictly competitive games. Evolutionary Equilibrium: Monomorphic pure strategy equilibrium; Mixed strategies and polymorphic equilibrium; Asymmetric contests; Variations on themes: Sibling behavior, Nesting behavior of wasps, The evolution of sex ratio. Iterated Games: Repeated games: The main idea; Preferences; Repeated games; Finitely and infinitely repeated Prisoner''s dilemma; Strategies in an infinitely repeated Prisoner''s dilemma;	8 Hours
Module V	
Iterated Games : Some Nash equilibria of an infinitely repeated Prisoner"s dilemma, Nash equilibrium payoffs of an infinitely repeated Prisoner"s dilemma. Coalitional Games and Bargaining: Coalitional games. The Core. Illustrations: Ownership and distribution of wealth, Exchanging homogeneous items, Exchanging heterogeneous items, Voting, Matching. Bargaining as an extensive game; Illustration of trade in a market; Nash's axiomatic model of bargaining	8 Hours

- 1. The question paper will have TEN questions.
- 2. There will be TWO questions in each module, covering all the topics.

3. The student need to answer FIVE full questions, selecting ONE full question from each module.

Text books:

Martin Osborne: An Introduction to Game Theory, Oxford University Press, Indian Edition, 2004. (Listed topics only from Chapters 1 to 11, 13, 14, 16)

Reference Books:

1. Roger B. Myerson: Game Theory: Analysis of Conflict, Harvard University Press, 1997.

2. Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green: Microeconomic Theory. Oxford University Press, New York, 1995.

3. Philip D. Straffin, Jr.: Game Theory and Strategy, The Mathematical Association of America, January 1993.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the concepts of a strategic games, mixed strategy equilibrium, extensive games.
	CO2	Interpret different concepts of distinct game theories.
	CO3	Analyze various game theories
	CO4	Categorize the concepts of strictly competitive games.
	CO5	Design extensive and iterated games.

WEB TECHNOLOGY AND APPLICATIONS		
Subject Code	19IS8OE	Credits:3
CIE:50	SEE:50	SEE: 03 hrs
H	Total Hours:42 Hrs	
Prerequisite: The studer Programming and Databa	ts must have knowledge of network Protocols, Basic ase concepts.	HTML
 Course Objectives: To enable the students to obtain the knowledge of Web Technology & J2EE in the following topics. Understand the fundamentals of internet protocols and develop static web pages. Create interactive WebPages using style sheets. Learn the basics about Client side scripts and Server side scripts. 		
Examine JavaScrip	ot frameworks such as jQuery, MVC and Backbone.	
Modules Teaching Hour		Teaching Hours
Module IFundamentals of Web, XHTML: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox.XHTML: Origins and evolution of HTML and XHTML; Basic syntax;8 Hours		
Standard XHTML doo Hypertext Links; Lists between HTML and XHT	cument structure. Basic text markup. Images; ; Tables; Forms; Frames; Syntactic differences FML.	
Mo	dule II	
CSS: Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images, The and <div> tags; conflict resolution .</div>		8 Hours

Module III			
JAVASCRIPT: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; pattern matching using regular expressions, errors in scripts, examples.			9 Hours
Module IV			
PHP Arrays and Superglobals, Arrays, \$_GET and \$_POST Superglobal Arrays, \$_SERVER Array, \$_Files Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling			8 Hours
	Moo	lule V	
Managing State, The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services XML Processing ISON Overview of Web Services			9 Hours
Question pap	er pattern:		
 1.The question 2. There will I 3. The studen module. 	n paper will be TWO que nt need to a	have TEN questions. stions in each module, covering all the topics. answer FIVE full questions, selecting ONE full o	question from each
Text books:			
 Programming the World Wide Web – Robert Sebesta 4th Edition Pearson Fundamentals of Web Development, Randy Connolly, Ricardo Hoar, , 1st Edition, Pearson Education India. (ISBN:978-9332575271) Reference Books: PHP and MySQL Web Development, Luke Welling, Laura Thomson, 5th Edition, Pearson Education, 2016. (ISBN:978-9332582736) Professional JavaScript for Web Developers , Nicholas C Zakas, , 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088) Course outcomes: On completion of the course, the student will have the ability to: 			
Course	CO #	Course Outcome (CO)	
Code			

CO1	Discuss the fundamentals of internet, web and identify the differences between XHTML and HTML.
CO2	Apply the concepts of Cascading style sheets for web development and XHTML documents.
CO3	Develop Client-Side Scripts using JavaScript .
CO4	Analyze and solve common web application tasks by writing PHP programs.
CO5	Inspect JavaScript frameworks like jQuery, MVC framework and Backbone which facilitates developer to focus on core features.

MOOC's Certificate Course		
Subject Code	19ISMC84	Credits:01
CIE : 50	SEE:50	

PROJECT WORK PHASE - II		
Subject Code	19ISP2	Credits:8
CIE:50	SEE:50	SEE: 03hours
Hours/Week: 2 Hrs(Theory)	Total Hours : 28	
Prerequisite: The Students should have the	knowledge of Software Engine	eering, Object
Oriented Modeling and Designing, Analysis a Programming Skills.	nd Design of Algorithms, Data S	Structures and
Course Objectives:		
• To apply programming skills for module implementation.		
• To design test case and perform module testing.		
• To understand the project management skills.		
• To understand the impact of proj	ect on society.	
• To demonstrate the documentation and presentation skills.		
		Teaching Hours
Project Phase – II comprises of:		
Students should continue with the problem defined	ned in Project Phase-II. The	

Project Phase-II comprises of:

- 1. Architectural design module analysis based on SRS.
- 2. Project implementation
- 3. Module validation and analysis
- 4. Future scope and limitations

5. Presentation

Evaluation of the project work will be done by means of conducting demo and checking the validation report periodically. Students should submit a project report along with executable code, at the end of the semester.

Note:

1. Project will be carried out in batches with a maximum of 3 students.

2. Any batch which does not complete Project Phase-I will not be permitted to commence with Project Phase-II.

Course outcomes:

Course Code	CO #	Course Outcome (CO)
	CO1	Implementation of functional modules and Architectural design representation.
	CO2	Evaluate the functional modules using advance testing tools and techniques.
	CO3	Evaluate module integration and Project management activities.
	CO4	Implementing the socio-economic and ethical systems.
	CO5	Demonstrate the documentation, publication and presentation skills.