Syllabus

(With effect from 2013-2014 Academic year)

ಪಠ್ಯಕ್ರಮ

(ಶೈಕ್ಷಣಿಕವರ್ಷ 2013–14)

VII & VIII Semester

Bachelor Degree
in
Computer Science and Engineering

Out Come Based Education

ಫಲಿತಾಂಶ ಆಧಾರಿತ ಶಿಕ್ಷಣ

P.E.S. College of Engineering, Mandya - 571 401, Karnataka

(An Autonomous Institution Affiliated to VTU, Belagavi)

Grant -in- Aid Institution

(Government of Karnataka)

Accredited by NBA, New Delhi

Approved by AICTE, New Delhi.

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಮಂಡ್ಯ–571 401, ಕರ್ನಾಟಕ

(ವಿ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)

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Preface

PES College of Engineering, Mandya, started in the year 1962, has become autonomous in the academic year 2008-09. Since, then it has been doing the academic and examination activities successfully. The college is running eight undergraduate and eight Postgraduate programs. It consists of six M.Tech programs, which are affiliated to VTU. Other postgraduate programs are MBA and MCA.

India has recently become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degree globally but also establishes equivalence to our degrees with that of the member nations such as Taiwan, Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan. Among other signatories to the international agreement are the US and the UK. Implementation of Outcome Based Education (OBE), has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

Our Higher Educational Institution has adopted the semester structure with OBE scheme and grading system.

The credit based OBE semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

The OBE, emphasize setting clear standards for observable, measurable outcomes of programs in stages. There lies a shift in thinking, teaching and learning processes moving towards Students Centric from Teacher Centric education. OBE standards focus on mathematics, language, science, attitudes, social skills & moral values.

The key features which may be used to judge, if a system has implemented an outcome based education system is mainly Standard based assessments that determines whether students have achieved the stated standard. Assessments may take any form, so long as the process actually measure whether the student knows the required information or can perform the required task. Outcome based education is a commitment that all students of all groups will ultimately reach the same minimum standards. Outcome Based Education is a method or means which begins with the end in mind and constantly emphasizes continuous improvement.

In order to increase the Industry/Corporate readiness, many Soft Skills and Personality Development modules have been added to the existing curriculum of 2013-14.Industry Interactions have been made compulsory to enhance the field experience. In order to enhance creativity and innovation Mini Project is included in all undergraduate programs.

Sri.B.Dinesh Prabhu
Deputy Dean (Academic)
Associate Professor,
Dept. of Automobile Engg.

Dr. P S Puttaswamy
Dean (Academic)
Professor,
Dept. of Electrical & Electronics Engg.

Vision

"An institution of high repute, imparting quality education to develop innovative and Humane engineers"

Mission

"Committed to develop students potential through high quality teaching- learning processes and state of the art infrastructure"

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

About the Department

The Department of Computer Science and Engineering was established in 1983. The department offers B.E. program with an intake of 120 students, M.Tech. in Computer Science and Engineering with 18 students, M.Tech. in Computer Engineering with 24 students and also Ph.D. programme. Currently the strength of teaching faculty is 32 and that of non teaching staff is 14. The teacher - student ratio is 1:16. The department has a research centre under VTU and University of Mysore, with 2 research guides and 8 research students. During the last five years, the department has published 85 technical papers in international/national journals/conferences. So far, the department has organized four international and 8 national conferences. The department is equipped with all the required infrastructure, laboratories, class rooms, departmental library. The departments wish to achieve the mission of developing and nourishing computer science engineers through well-trained, committed and experienced faculty members. Faculty members of the departments are involved in research activities in different fields such as Image Processing, Pattern Recognition, Data Mining, Wireless Networks, Big Data Analytics and Computer Vision.

Vision

"*To develop globally competent computer professionals by exploring latest technologies through continuous learning, research and innovation."*

Mission

"To impart quality technical education in modern practices of Computer Science and Engineering through competent faculties, state of the art teaching–learning infrastructure and methodologies".

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Programme Educational Objectives (PEOS) are

I. To provide students with a strong basis in the mathematical, scientific and engineering fundamentals to solve computer science engineering problems and to prepare them for employment, higher learning, R&D and consultancy.

II. *To provide technical knowledge, skills and awareness of current technologies of computer science engineering and to develop an ability to design and provide novel engineering solutions for software/hardware problems through entrepreneurial skills.*
III. *To provide an exposure to emerging cutting edge technologies to work as teams on multidisciplinary projects with effective communication skills and leadership qualities.*
IV. *To provide an ability to function ethically and responsibly in a rapidly changing environment by applying innovative technologies that allows them to become effective professionals in Computer Science to sustain a life-long career in related areas.*

Program outcomes (POs)

A graduate of the Computer Science and Engineering Program will demonstrate

a) An ability to apply knowledge of computing, mathematical foundations, computer science and engineering fundamentals. (Fundamental engineering analysis skills).
b) An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution (Information retrieval skills).
c) An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs. (creative skills).
d) An ability to identify, formulate and solve computer science engineering problems for obtaining its solutions using the appropriate computing and engineering requirements (engineering problem solving skills).
e) An ability to use current techniques, skills, and modern engineering tools necessary for computing and engineering practice (practical engineering analysis skills).
f) The broad education necessary to understand the impact of engineering solutions in a global and societal context (engineering impact assessment skills).
g) A knowledge of contemporary issues (social awareness).
h) An understanding of professional, ethical, legal, security and social issues and responsibilities (professional integrity).
i) An ability to function effectively individually and on teams to accomplish a common goal (teamwork).
j) An ability to communicate effectively, both in writing and orally with a range of audiences (speaking / writing skills).
k) Recognition of the need for, and an ability to engage in continuing professional development and life-long learning (continuing education awareness).
l) An ability to acquire concepts to integrate computer science and engineering principles in the construction of software and hardware systems of varying complexity (software hardware interface).
m) An ability to recognize the importance of professional development by pursuing postgraduate studies or face competitive examinations that offer challenging and rewarding careers in computing (successful career and immediate employment).

These programme outcomes (POs) are achieved through an array of courses. To ensure the achievement of POs, the course learning outcomes (CLOs) are so formulated that they address these POs.

VII Semester B.E. (CS&E) **Scheme of Teaching and Examination 2013- 14**

Sl. No.	Course code	Course Title	Teaching Dept.	Hours/Week Pattern	Total Credits	Examination Marks			Exam Duration in hours
				L :T: P:H		CIE	SEE	Total	
1	P13CS71	Distributed Computing Systems	CS	3:2:0: 5	4	50	50	100	3
2	P13CS72	Object Oriented Modeling & Design	CS	4:0:0: 4	4	50	50	100	3
3	P13CS73	Multi Core Architecture & Parallel Programming	CS	4:0:0: 4	4	50	50	100	3
4	P13CS74	Wireless Technology	CS	2:2:0:4	3	50	50	100	3
5	P13CS75*	Elective-II	CS	4:0:0: 4	4	50	50	100	3
6	P13CS76*	Elective-III	CS	4:0:0: 4	4	50	50	100	3
7	P13CSL77	Networks Laboratory	CS	0:1:2:3	1.5	50	50	100	--
8	P13CSL78	Java Programming Laboratory	CS	0:1:2:3	1.5	50	50	100	--
				Total	26	400	400	800	

Elective II **Elective III**

Sl. No.	Course code	*Course Title*	Course code	*Course Title*
1	P13CS751	Information Storage & Management	P13CS761	Big Data Analytics
2	P13CS752	Pattern Recognition	P13CS762	Digital Image Processing
3	P13CS753	Mobile Computing	P13CS763	Wireless Sensor Networks
4	P13CS754	Artificial Intelligence	P13CS764	Network Management Systems
5	P13CS755	Arm Based System Design	P13CS765	Web 2.0 & Rich Internet Applications

VIII Semester

VIII Semester B.E. (CS&E) **Scheme of Teaching and Examination 2013- 14**

Sl. No.	Course code	*Course Title*	Teaching Dept.	Hours/Week Pattern	Total Credits	Examination Marks			Exam Duration in hours
				L :T: P		CIE	SEE	Total	
1	P13CS81	Cryptography & Network Security	CS	2:2:0:4	3	50	50	100	3
2	P13CS82	Internet of Things	CS	2:2:0:4	3	50	50	100	3
3	P13CS83*	Elective-IV	CS	2:2:0:4	3	50	50	100	3
4	P13CS84*	Elective-V	CS	2:2:0:4	3	50	50	100	3
5	P13CS85	Project work	CS	--	10	100	100	200	3
6	P13CS86	Seminar	CS	0:2:0:2	0	50	--	50	3
				Total	22	350	300	650	

Elective IV **Elective V**

Sl. No.	Course code	*Course Title*	Course code	*Course Title*
1	P13CS831	Real Time Systems	P13CS841	Fuzzy Logic
2	P13CS832	Decision Support System	P13CS842	Software Testing
3	P13CS833	Business Intelligence and Applications	P13CS843	Agile Technologies
4	P13CS834	Service Oriented Architecture	P13CS844	Cyber Security
5	P13CS835	Information Theory and Coding	P13CS845	Ubiquitous Computing

Evaluation Scheme							
Scheme	**Weightage**	**Marks**	**Event Break Up**				
CIE	50%	50	**Test I**	**Test II**	**Quiz I**	**Quiz II**	**Assignment**
			35	35	5	5	10
SEE	50%	100	**Questions to Set: 10**		**Questions to Answer: 5**		

Course Title: Distributed Computing System			
Course Code: P13CS71	**Semester : VII**	**L-T-P: 3:1:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites:

1. Operating system
2. System programming

Course Learning Objectives (CLO's)

The course aims to:

The student should be able to understand

1. Current literature in distributed systems.
2. The concepts related to distributed computing systems.
3. The focus on performance and flexibility issues related to systems design decisions.
4. The abstraction and details of file systems.
5. To prepare students for an industrial programming environment.

Course Content

Unit 1

Characterization of Distributed Systems-Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental. Interprocess Communication -Introduction-API for Internet protocols-External data representation and marshalling, Multicast communication, Network virtualization, Case study: MPI.

10 Hours

Unit 2

Remote Invocation-Introduction-Request-replay protocols-Remote procedure calls-Remote method invocation-Case study: Java RMI.

Operating System Support-Introduction-OS layer-Protection-Processes and threads-Communication and invocation OS architecture.

11 Hours

Unit 3

Distributed File Systems-Introduction-File service architecture-Case Study: Sun Network File System-Enhancements and further developments. Name Services-Introduction-Name Services and the Domain Name System-Directory Services-Case Study: Global Name Service.

10 Hours

Unit -4

Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging. Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections-Coordination and agreement in group communication-Consensus and related problems.

10 Hours

Unit -5

Transaction & Concurrency Control-Introduction-Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparision of methods for concurrency control. Distributed Transaction – Introduction, Flat & nested distributed

transaction, Atomic commit protocols, Concurrency control in distributed transaction, distributed deadlocks, transaction recovery.

11 Hours

Text Book:

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 5th Edition, Pearson Education, 2012.

References:

1. A.S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2014.
2. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2014.

Course Outcome:

1. **Understand** the characterization of Distributed Systems and **Study** system models & IPC.
2. **Explain** Distributed Objects and Remote Invocation and the support of Operating System.
3. **Explain** about Distributed File Systems and naming services.
4. **Explain** the concept of Time and Global States.
5. **Understand** transaction & concurrency control.

Course Title :Object Oriented Modeling and Design			
Course Code: P13CS72	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites:

1. Object oriented concepts
2. Software engineering

Course Objectives

This course aims to:

1. Introducing students to the concepts and terms used in the object-oriented approach to systems analysis and design ·
2. Highlighting the importance of object-oriented analysis and design and its limitations. · Showing how we apply the process of object-oriented analysis and design to software development. ·
3. Pointing out the importance and function of each UML model throughout the process of object-oriented analysis and design and explaining the notation of various elements in these models. ·
4. Providing students with the necessary knowledge and skills in using object-oriented CASE tools

Course content

Unit 1

Introduction, Modelling Concepts, class Modelling: Object Orientation, OO development, OO themes, Evidence for usefulness of OO development, OO modelling history Modelling as Design Technique: Modelling, abstraction, The three models. Class Modelling: Object and class concepts, Link and associations concepts, Generalization and inheritance, A sample class model, Navigation of class models.

Advanced Class Modelling, State Modelling: Advanced object and class concepts, Association ends, N-ary associations, Aggregation, Abstract classes, multiple inheritance, Metadata, Reification, Constraints, Derived data, Packages, Practical tips. State Modelling: Events, States, Transitions and Conditions, State diagrams, State diagram behaviour.

10 Hours

Unit 2

Advanced State Modelling, Interaction Modelling: Advanced State Modelling: Nested state diagrams, Nested states, Signal generalization, Concurrency, A sample state model, Relation of class and state models, Practical tips. Interaction Modelling: Use case models, Sequence models, Activity models. Use case relationships, Procedural sequence models

Process Overview, System Conception, and Domain Analysis: Process Overview: Development stages, Development life cycle. System Conception: Devising a system concept, elaborating a concept, Preparing a problem statement. Domain Analysis: Overview of analysis, Domain class model, Domain state model, Domain interaction model..

11 Hours

Unit 3

Application Analysis, System Design: Application Analysis: Application interaction model, Application class model, Application state model, Adding operations. Overview of system

design, Estimating performance, Making a reuse plan, Breaking a system in to sub-systems, Identifying concurrency, Allocation of sub-systems, Management of data storage, Handling global resources, Choosing a software control strategy, Handling boundary conditions, Setting the trade-off priorities, Common architectural styles 10 Hours

Unit 4

Class Design, Implementation Modelling, Legacy Systems: Class Design: Overview of class design, Bridging the gap, Realizing use cases, Designing algorithms, Recursion downwards, Refactoring, Design optimization, Reification of behavior, Adjustment of inheritance, Organizing a class design, ATM example. Implementation Modelling: Overview of implementation, Fine-tuning classes, Fine-tuning generalizations, realizing associations, testing. Legacy Systems: Reverse engineering, Building the class models, Building the interaction model, Building the state model, Reverse engineering tips. 11 Hours

Unit 5

Design Patterns – 1: What is a pattern and what makes a pattern? Pattern categories, Relationships between patterns, Pattern description Communication Patterns: Forwarder-Receiver, Client-Dispatcher-Server, Publisher-Subscriber.

Design Patterns – 2, Idioms: Management Patterns: Command processor, View handler. Idioms: Introduction, what can idioms provides? Idioms and style, Where to find idioms, Counted Pointer example. 10 Hours

Text Books:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005. (Chapters 1 to 17, 23)
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern- Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007. (Chapters 1, 3.5, 3.6, 4)

Reference Books:

1. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson Education, 2007.
2. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.

Course Outcomes:

At the end of the course the student would have the:

1. The Knowledge of the basic concepts of Object oriented modeling and Design.
2. Will be able to use the Object Oriented notations and process that extends from analysis through design to implementations.
3. Be able to use all the standard UML notations.
4. Capable to model the requirements with use cases and describe the dynamic behavior and structure of the design.
5. Easily create a modular design with components and relate the logical design to the physical environment.
6. The Student will be able to use the concept of design patterns and apply it where suitable.

Course Title :Multi Core Architecture & Parallel Programming			
Course Code: P13CS73	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites:

1. Computer organization
2. Computer architecture

Course learning objectives

The course aims to:

1. To understand the recent trends in the field of Computer Architecture and identify performance related parameters
2. To appreciate the need for parallel processing
3. To expose the students to the problems related to multiprocessing
4. To understand the different types of multicore architectures
5. To understand concepts of multi threading, OPENMP.

Course Content

Unit -1

Introduction to Multi-core Architecture Motivation for Concurrency in software, Parallel Computing Platforms, Parallel Computing in Microprocessors, Differentiating Multi-core Architectures from Hyper- Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms Understanding Performance, Amdahl's Law, Growing Returns: Gustafson's Law.

System Overview of Threading : Defining Threads, System View of Threads, Threading above the Operating System, Threads inside the OS, Threads inside the Hardware, What Happens When a Thread Is Created, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, System Virtualization.

12 Hours

Unit -2

Fundamental Concepts of Parallel Programming : Designing for Threads, Task Decomposition, Data Decomposition, Data Flow Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A Motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An Alternate Approach: Parallel Error Diffusion, Other Alternatives.

Threading and Parallel Programming Constructs: Synchronization, Critical Sections, Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control- based Concepts, Fence, Barrier, Implementation-dependent Threading Features. 10 Hours

Unit -3

Threading APIs: Threading APls for Microsoft Windows, Win32/MFC Thread APls, Threading APls for Microsoft. NET Framework, Creating Threads, Managing Threads, Thread Pools, Thread Synchronization, POSIX Threads, Creating Threads, Managing Threads, Thread Synchronization, Signaling, Compilation and Linking. 10 Hours

Unit -4

OpenMP: A Portable Solution for Threading: Challenges in Threading a Loop, Loop-carried Dependence, Data-race Conditions, Managing Shared and Private Data, Loop Scheduling and Portioning, Effective Use of Reductions, Minimizing Threading Overhead, Work-sharing Sections, Performance-oriented Programming, Using Barrier and No wait,

Interleaving Single-thread and Multi-thread Execution, Data Copy-in and Copy-out, Protecting Updates of Shared Variables, Intel Task queuing Extension to OpenMP, OpenMP Library Functions, OpenMP Environment Variables, Compilation, Debugging, performance.

10 Hours

Unit -5

Solutions to Common Parallel Programming Problems : Too Many Threads, Data Races, Deadlocks, and Live Locks, Deadlock, Heavily Contended Locks, Priority Inversion, Solutions for Heavily Contended Locks, Nonblocking Algorithms, ABA Problem, Cache Line Ping-ponging, Memory Reclamation Problem, Recommendations, Thread-safe Functions and Libraries, Memory Issues, Bandwidth, Working in the Cache, Memory Contention, Cache-related Issues, False Sharing, Memory Consistency, Current IA-32 Architecture, Itanium Architecture, High-level Languages, Avoiding Pipeline Stalls on IA-32,Data Organization for High Performance.

10 Hours

Text Book:

1. Multicore Programming, Increased Performance through Software Multi-threading by Shameem Akhter and Jason Roberts, Intel Press, 2006

Course outcomes

At the end of the course the student should be able to

1. **Point out** the salient features of different multicore architectures and how they exploit parallelism.
2. **Describe** the Fundamental concepts of parallel programming and constructs.
3. **Compare** the different threading API'S.
4. **Writ**e a multithreading programming using OPENMP.
5. **Explain** the concepts of deadlocks, data races & Design a Nonblocking Algorithms.

Course Title : Wireless Technology			
Course Code: P13CS74	**Semester : VII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites: Know the concept of networking

Course Learning Objectives (CLOs)

This course aims to

1. **Describes** a comprehensive, Broad-based coverage of the fundamental aspects of the most popular forms of wireless telecommunications systems and emerging wireless technologies used to extend the reach of the wired public or private data network.
2. **Understanding** about the fundamental operations of the wireless technologies used by professionals and technicians involved in a technical-support segment of this field.
3. **Understand and** Gain knowledge about other popular technologies in this and next generation of wireless telecommunications system and networks.
4. **Understand and analyze** of both major cellular technologies (GSM and CDMA) provides the reader with a clearly defined path for the migration from these technologies to 3G cellular.
5. **Understanding** the concepts of GSM and CDMA cellular systems, 3G cellular, and IEEE standards-based wireless LANs, PANs, and MANs.
6. **Describe** emerging wireless air interface and network technologies that will be incorporated into the next generation of wireless systems.

Relevance of the course:

1. This course presents the theoretical knowledge needed and fundamental aspects of the most popular forms of wireless telecommunications systems and emerging wireless technologies used to extend the reach of the wired public or private data network.
2. The student will also understand the concepts of GSM and CDMA cellular systems, 3G cellular, and IEEE standards-based wireless LANs, PANs, and MANs.
3. This course gives students sufficient preparation for the Wireless Technologies course.

Course Content

Unit 1

History and evolution of wireless radio systems, Different generations of wireless cellular networks. Common cellular system components: Common cellular network components, software views of cellular network, 3G cellular system components, Identification, call establishment. 10 Hours

Unit 2

Wireless Network Architecture and operation The cellular concept, cell fundamentals, capacity expansion techniques, cellular backhaul networks, mobility management, wireless network security. GSM and TDMA technology: Introduction to GSM and TDMA, GSM network and system architecture, GSM channel concept, GSM system operations, GSM Identifiers, GSM protocol architecture, TDMA systems. 10 Hours

Unit 3

CDMA technology, CDMA overview, CDMA network and system architecture, CDMA channel concept, CDMA operations, Cellular wireless data networks - 2.5 and 3G systems: CDPD, GPRS and EDGE data networks, CDMA data networks, Evolution of GSM and NA-TDMA to 3G, SMS, EMS, MMS and MIM services. 11 hours

Unit 4

Wireless Modulation Techniques and hardware: Transmission characteristics of Wire line and fiber systems, characteristics of the air interface, wireless telecommunications coding techniques, digital modulation techniques, spread Spectrum modulation techniques, UWRT Technology, diversity techniques. 10 Hours

Unit 5

Broadband satellite and microwave systems: Introduction, Fundamentals of satellite systems, broadband and satellite networks, broadband microwave and millimetre wave system. Emerging wireless technologies: Introduction to emerging wireless network technologies, new emerging air interface technologies, and new wireless network implementations. 11 hours

Text Book:

1.Wireless Telecom systems and networks, Mullet Thomson learning, 2006

Reference Books:

1. Fundamentals of wireless communication, David Tse, Pramod Viswanath, Cambridge 2000.
2. Mobile Cellular Telecommunication. Lee W.C.Y,MGH 2002

Course Outcomes:

After learning all the units of the course, the student is able to

1. **Understand** the general history and evolution of wireless technology.
2. **Analyze** the concept of the different generations of wireless cellular systems.
3. **Understand and apply** the knowledge about other popular technologies in this and next generation of wireless telecommunications system and networks.
4. **Understanding** of both major cellular technologies (GSM and CDMA) provides the reader with a clearly defined path for the migration from these technologies to 3G cellular.
5. **Understanding and analyze** the emerging wireless air interface and network technologies that will be incorporated into the next generation of wireless systems.

	Model Question Paper	Marks	CO's	Levels
	Unit-I			
1.a	Explain how frequency division duplex operation was achieved by first –generation cellular systems.	6	Co1	L2
b.	Explain the sequence of events that occurs when an AMPS cellular telephone is first turned on.	7	CO1	L2
c.	Explain AMPS mobile –originated call in detail.	6	CO1	L2
2.a	Explain AMPS mobile-terminated call in detail	6	CO1	L2
b.	Explain the concept of time division duplex.	7	CO1	L3
c.	Explain the functions of the following i.VLR ii.HLR iii.MSC iv.LAI	7	CO1	L2
	UNIT - II			
3.a	Determine the frequency reuse distance for a cell radius of 20 KM and a cluster size of 7.	6	CO2	L1,L2
b.	Explain cell splitting and cell sectoring in detail.	6	CO2	L2
c.	Explain GSM Intra-BSC handover concept in detail.	8	CO2	L3
4.a	Explain mobility management in detail.	6	CO2	L2
b.	Define handoff. Explain handoff operations in detail.	4	CO2	L2,L3
c.	Describe the process of power control used by cellular systems.	6	CO2	L3
	Unit III			
5.a.	Explain the steps a CDMA mobile goes through in the initialization state.	6	CO3	L2
b.	Explain the basic operation of GSM GPRS.	7	CO3	L2
c.	Describe the generation of the IS-95 CDMA pilot channel.	7	CO3	L1, L2
6.a.	Differentiate EMS /MMS and SMS.	6	CO3	L2
b.	Explain the basic difference between 1G and 2G wireless in terms of data services.	7	CO3	L2
c.	How does the use of spreading codes increase signal bandwidth.	7	CO3	L1
	UNIT- IV			
7.a	Explain DSSS operation.	8	CO4	L2
b	Explain the basic process involved in the block interleaving of data bits before transmission.	8	CO4	L2
c	Explain an OFDM modulation system.	4	CO4	L2
8.a.	What technique is used to compensate for noise problems encountered when transmitting digital information over conductor-based transmission lines.	6	CO4	L1
b.	Explain 8-PSK modulation.	7	CO4	L2
c.	Explain FHSS operation.	7	CO4	L1
	UNIT - V			
9a	Explain categories of satellite systems.	6	CO5	L1
b	Explain the basic concept behind the operation of MIMO wireless.	7	CO5	L1, L2
c	Explain the basic concept of CRT.	7	CO5	L2
10.a	Explain technical challenges for broadband satellite systems.	10	CO5	L3
b.	Explain bent-pipe concept in relation to satellite communication systems.	10	CO5	L2

ELECTIVE – II

Course Title :Information Storage & Management			
Course Code: P13CS751	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites: Student should have knowledge of basic computer architecture, operating systems, networking, and databases.

Course Learning Objectives (CLOs):

1) To evaluate storage architectures and key data center elements in classic, virtualized and cloud environments
2) To explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems
3) To describe storage networking technologies such as FCSAN, IP-SAN, FCoE, NAS and object-based, and unified storage
4) To understand and articulate business continuity solutions – backup and replications, along with archive for managing fixed content

Relevance of the Course:

This course aims to provide a comprehensive learning on storage technology, which will enable you to make more informed decisions in an increasingly complex IT environment and builds a strong understanding of underlying storage technologies.

The course has been designed to help the students of computer Science and Engineering to understand the storage technology by studying the features of storage, you can combine the storage techniques with big data analytics which gives greater support to understand the new trend in storage.

Course Content

UNIT - 1

Storage system: Introduction to information storage and management Information storage, Evolution Date center Infrastructure, Information life cycle management. Components of a Storage system Environment, Disk Drive components, Disk drive performance, Logical Components of the Host.

Data Protection: RAID, Implementation of RAID, RAID array components, RAID Levels, Striping, Mirroring, parity, RAID 0, RAID 1, Nested, RAID, RAID 3, RAID 4, RAID 5,RAID 6.

Intelligent storage system: Components of an Intelligent storage system, Front end, Cache, Back End, Physical Disk, intelligent storage array, Concepts in Practice 11 Hours

UNIT - 2

Direct Attached storage and Introduction to SCSI: Types of DAS, Internal DAS, External DAS,DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model

Storage Area Networks : Fibre Channel: Overview, The SAN and its Evolution, Components of SAN,FC Connectivity, Fibre channel ports, Fibre channel Architecture, Zoning, FC Topologies, Core-Edge Fabric, Mesh Topology, Concepts in Practice: EMC Connectivity Summary.

Network-Attached Storage: General-Purpose servers vs NAS Devices , Benefits of NAS, NAS File I/O, Components of NAS,NAS Implementations, NAS File-Sharing –Protocols, NAS I/O Operations, Factors affecting NAS Performance, Concepts in practice: EMC CELERRA 10 Hours

UNIT - 3

IPSAN: ISCSI, ISCSI Host Connectivity, Topologies for ISCSI Connectivity, ISCSI Protocol stack, ISCSI Discovery, names, session, PDU, Ordering and numbering, FCIP,FCIP Topology.

Content-Addressed Storage:

Fixed Content and Archives, Features and Benefits of CAS,CAS Architecture, object storage and Retrieval in CAS,CAS Examples, Concepts in practice :EMC Center.

Storage Virtualization: Forms of Virtualization, SNIA Storage virtualization Taxonomy, Storage virtualization Configuration, Storage virtualization Challenges, Types of Storage Virtualization, Concepts in Practice.

11 Hours

UNIT - 4

Business Continuity : Introduction: Information Availability, BC Terminology, ,BC Planning Life cycle, Failure Analysis, Business Impact Analysis ,BC Technology solutions, Concept in Practice: EMC Power path

Backup and Recovery: Backup purpose, Backup considerations, Backup Granularity ,Backup methods , Backup consideration, Backup process, Backup and Restore Operations Backup Topologies, Backup, Backup in NAS Environment, Backup technologies , Backups to tape, Backup to Disk, Virtual Tape Libraries.

10 Hours

UNIT - 5

Local Replication: Local Replication, Local Replication Technologies, Restore and Restart Considerations, Creating multiple Replicas, Concepts in Practice

Remote Replication: Modes of Remote Replication, Remote Replication Technologies, Network Infrastructure, Concepts in practice

Securing and Storage Infrastructure: Storage Security Framework, Risk Triad, Storage Security Domain.

Managing the Storage Infrastructure: Monitoring the Storage Infrastructure, Storage Management Activities, Storage Infrastructure Management Challenges, Developing an Ideal Solution. 10 Hours

Text Book:

1. G.Somasundaram, Alok Shrivastava Information Storage and Management

Reference Book:

1. Richard Barker and Paul Massiglia: Storage Area Network Essentials A complete Guide to understanding and Implementing SAN's ,John Wiley India,2014.

Course Outcomes:

1. Evaluating storage architectures and key data center elements in classic, virtualized and cloud environments
2. Explaining physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems
3. Describing storage networking technologies such as FCSAN, IP-SAN, FCoE, NAS and object-based, and unified storage
4. Understanding business continuity solutions – backup and replications, along with archive for managing fixed conten

Model Question Paper:

Q. No	Questions	Marks	CO's	Levels
	Unit - 1			
1 a)	Describe Information life cycle management.	7	CO1	L1, L2
b)	Describe the Disk Drive components, Disk drive performance.	7	CO1	L2
c)	Identify RAID array components .	6	CO1	L3
	OR			
2 a)	Define information storage and management .	6	CO1	L2
b)	Describe Evolution of Date center Infrastructure.	8	CO1	L1
c)	Explain RAID 0, RAID 1 and Nested.	6	CO1	L3
	Unit - 2			
3a)	Explain Internal DAS, External DAS,DAS Benefits and Limitations	9	CO2	L2,L2
b)	Describe the Benefits of NAS ,NAS File I/O .	6	CO2	L3
c)	Differentiate Components of SAN,FC Connectivity, Fibre channel ports	5	CO2	L3
	OR			
4 a)	List the Factors affecting NAS Performance.	7	CO2	L3
b)	Describe the The SAN and its Evolution .	6	CO2	L2
c)	Definition of General-Purpose servers vs NAS Devices.	7	CO2	L3
	Unit - 3			
5a)	Explain Features and Benefits of CAS.	5	CO3	L1,L2
b)	Explain Fixed Content and Archives.	10	CO3	L6
c)	Define Forms of Virtualization.	5	CO3	L3
	OR			
6) a)	Explain ISCSI, ISCSI Host Connectivity, Topologies for ISCSI Connectivity	8	CO3	
b)	Explain Fixed Content and Archives.	6	CO3	L1,L2
c)	Design Storage virtualization Configuration .	6	CO3	L3
	Unit - 4			
7 a)	Explain BC Planning Life cycle, Failure Analysis, Business Impact Analysis ,BC Technology solutions.	6	CO4	L2
b)	Explain Backup methods , Backup consideration, Backup process	6	CO4	L2
c)	Explain Backup in NAS Environment Backup technologies	8	CO4	L6
	OR			
8 a)	Define Information Availability, BC Terminology	7	CO4	L3
b)	Define Backup and Recovery.	7	CO4	L1,L2
c)	Explain Backup in NAS Environment Backup technologies.	6	CO4	L2
	Unit - 5			
9 a)	Describe Modes of Remote Replication Write unambiguous transactions.	8	CO5	L1,L2
b)	Describe Remote Replication Technologies, Network Infrastructure.	6	CO5	L1,L2
c)	Describe Risk Triad, Storage Security Domain.	6	CO5	L3

OR				
10 a)	Explain Local Replication, Local Replication Technologies List desirable properties of Transaction	7	CO5	L2
b)	Describe Risk Triad, Storage Security Domain.	6	CO5	L3
c)	Explain Storage Infrastructure Management Challenges.	7	CO5	L2

Course Title :Pattern Recognition			
Course Code: P13CS752	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Perquisites:

Basic knowledge in engineering mathematics, Linear Algebra, Fundamentals of probability theory and statistics, programming knowledge.

Course Learning Objectives

1. Introduce to fundamental concept, statistical approach to pattern recognition.
2. Learn how to design optimal classifier and focus on related techniques of parameter estimation.
3. Know about non parametric procedures used with arbitrary distribution, various procedures for determining discriminant function.
4. To learn unsupervised procedure that used unlabelled sample.
5. Introduce to various methodologies for identification and verification of a person

Relevance of the Course:

Ability to apply mathematical foundations, algorithmic principles in modeling and design of real world problem of varying complexity.

Course Content

Unit 1

Introduction and Bayesian Decision Theory: Machine perception, an example; Pattern Recognition System; The Design Cycle; Learning and Adaptation. Introduction to Bayesian Decision Theory; Continuous Features, Minimum error rate, classification. 10 Hours

Unit 2

Classifiers, discriminant functions, and decision surfaces; The normal density; Discriminant functions for the normal density. **Parameter Estimation Techniques:** Introduction to Maximum-likelihood estimation; Bayesian Estimation; Bayesian parameter estimation: Gaussian Case, general theory. 10 Hours

Unit 3

Non-Parameter Estimation Techniques: Introduction to Non Parametric Techniques; Density Estimation; Parzen windows; k_n – Nearest- Neighbor Estimation; The Nearest-Neighbor Rule; Metrics and Nearest-Neighbor Classification. **Linear Discriminant Functions:** Introduction; Linear Discriminant Functions and Decision Surfaces; Generalized Linear Discriminant Functions; The Two-Category Linearly Separable case; Minimizing the Perception Criterion Functions; Relaxation Procedures; Non-separable Behavior; Minimum Squared-Error procedures; The Ho-Kashyap procedures. 10 Hours

Unit 4

Unsupervised Learning and Clustering: Introduction; Mixture Densities and Identifiability; Maximum-Likelihood Estimates; Application to Normal Mixtures; Unsupervised Bayesian Learning; Data Description and Clustering; Criterion Functions for Clustering. 10 Hours

Unit 5

Introduction to Biometrics: Biometric methodologies: finger prints, hand geometry, facial recognition, Iris scanning, retina scanning, identification & verification – the distinction, performance criterion.

12 Hours

Text Book:

1. Richard O.Duda, Peter E.Hart, David G. Stork, "Pattern Classification", John Wiley publication, 2nd edition, 2001.

Reference Books:

1. Robert Schalkoff, "Pattern Recognition: Statistical, Structural and Neural Approaches", John Wiley & Sons, Inc.1992.
2. Christopher M. Bishop ,"Pattern Recognition and Machine Learning", Springer publication, 2006
3. K.Jain, R.Bolle, S.Pankanti, "Biometric: Personal Identification in network society", Kluwer academic publishers, 1999.

Course Outcomes:

After completing this course, students should be able to:

1. Classify patterns using Bayesian Decision Theory.
2. Recognize patterns using parametric techniques.
3. Perform subspace analysis for classification problems
4. Choose an appropriate model for unsupervised learning.
5. Design various biometric technologies for different applications

Model Question paper

Q. No	Questions	Marks	CO's	Levels
	Unit - 1			
1 a)	Briefly explain the step of Pattern Recognition System with a diagram.	7	CO1	L2
b)	List and explain any one Learning techniques of Pattern Recognition.	7	CO1	L1,L2
c)	Briefly explain the Neyman-Pearson criterion.	6	CO1	L2
	OR			
2 a)	With a neat diagram, explain design cycle of Pattern Recognition System.	8	CO1	L2
b)	Explain the Minimax criterion.	6	CO1	L2
c)	Explain any one method of Feature Extraction technique.	6	CO1	L2
	Unit - 2			
3a)	Explain and simplify the Convergence of the Variance.	8	CO2	L1,L3
b)	Write a short on Multivariate Density.	5	CO2	L1
c)	Describe Factorization theorem.	7	CO2	L2
	OR			
4 a)	Explain the Gibbs Algorithm.	8	CO2	L2
b)	Write and explain the log-likelihood function and Bias & unbiased estimator.	12	CO2	L1,L2
	Unit - 3			
5a)	Explain and simplify the Convergence of the Variance.	8	CO3	L1
b)	Write and explain briefly the PNN algorithm for Training and Classification.	12	CO3	L1,L2
	OR			
6 a)	Explain the properties of a Metrics.	7	CO3	L1
b)	Define Discriminant functions and Training error?	5	CO3	L1
c)	Explain the category cases of Linear Discriminant Functions.	8	CO3	L2
	Unit - 4			
7 a)	Write a short on Data description and Clustering.	6	CO4	L2
b)	State and prove that Perceptron Convergence Theorem.	7	CO4	L1,L3
c)	List out the Criterion Functions for Clustering and explain any one.	8	CO4	L1,L2
	OR			
8 a)	Write an algorithm of Batch Relaxation with margin and Single-Sample Relaxation with margin.	10	CO4	L3
b)	Write Ho-Kashyap algorithm.	5	CO4	L3
c)	Write a short on Data description and Clustering.	5	CO4	L1
	Unit - 5			
9 a)	Explain briefly Connected Component technique.	7	CO5	L2
b)	Write an algorithm of Newton's Descent	8	CO5	L3
c)	List out the preprocessing techniques and explain any one of them.	5	CO5	L1,L2
	OR			

10 a)	Write a note on template matching in the context of face recognition.	5	CO5	L1
b)	Mention the techniques which are used for noise removal.	3	CO5	L1
c)	Explain Quadratic Discriminant.	12	CO5	L2

Course Title :Mobile Computing			
Course Code: P13CS753	**Semester : VII**	**L-T-P: : 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites: Know the concept of networking

Course Learning Objectives (CLOs)

1. **Understand** the mobile computing architecture, foundation for mobile computing.
2. **Understand** GSM technologies, concepts of cellular networks, **analyze** GSM
3. **Analyze** Architecture and different elements within the GSM network. Understand SMS architecture SMS data technology.
4. **Understand** GPRS architecture, difference between GSM and GPRS.
5. **Understand** WAP and MMS technology, WAP application, understand how to develop MMS applications.
6. **Understand** WLAN, Understand scope and importance of WLAN.
7. **Understand** PalmOS for PDA, understand tools and techniques to develop mobile applications for PalmOS.

Relevance of the course:

1. This course presents the theoretical knowledge needed and fundamental aspects of the Mobile computing..
2. The student will also understand the concepts of GSM, GPRS,WAP,MMS,SMS, WLAN
3. The student will also understand tools and techniques to develop mobile applications for PalmOS.
4. This course gives students sufficient preparation for the Mobile Computing course.

Course Content

Unit 1

Mobile Computing, Middleware and gateways, application and services, security in mobile computing. Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. Mobile IP, Internet Protocol version 6(IPV6). 10 Hours

Unit 2

Global Systems for Mobile Communication,(GSM) GSM Architecture, GSM Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Short Message Service (SMS): Mobile Computing over SMS, value added service through SMS, accessing the SMS bearer.

12 Hours

Unit 3

General Packet Radio Service (GPRS):GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Billing and Charging in GPRS.

Wireless Application Protocol(WAP): WAP,MMS,GPRS applications.

CDMA and 3G:spread spectrum technology,IS-95,CDMA versus GSM, Wireless data, Third Generation Networks, applications of 3G. 10 Hours

Unit 4

Wireless LAN: wireless LAN advantages, IEEE 802.11 standards, wireless LAN architecture, mobility in wireless LAN, deploying wireless LAN, mobile ad hoc networks and sensor

networks, wireless LAN security, wireless access in vehicular environment, wireless local loop, hiperLAN ,WIFI versus 3G. 10 Hours

Unit 5

Programming for the palm: history of palm, palm OS architecture, application development, communication in palm OS, Multimedia, enhancements in the current release, latest in palm: Wireless devices with Symbian: introduction to Symbian OS, Symbian OS architecture, applications for Symbian, controls and compound controls, active objects, localization, security on the Symbian, latest in Symbian. 10 Hours

Course Outcomes :

The students shall able to:

1. **Understand** mobile computing architecture, foundation for mobile computing.
2. **Understand** and **Analyze** GSM technologies, SMS concepts, GPRS concepts.
3. **Understand** and A**nalyze**WAP and MMS technology, WAP application, understand how to develop MMS applications.
4. **Understand** WLAN, how to use WLAN, Understand scope of WLAN.
5. **Understand** PalmOS for PDA, Understand tools and techniques to develop mobile applications for PalmOS.

Text Books :

1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.

Reference Books :

1. Martyn Mallik: Mobile and wireless design essentials, Wiley ,India,2003
2. Raj kamal: Mobile Computing, Oxford University Press, 2007.
3. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

Model Question Paper				
Q. No	**Questions**	**Marks**	**CO's**	**Levels**
	Unit - 1			
1 a)	What is middle ware? Describe its significance in handling the context of any application.	7	CO1	L2
b)	Describe the functions of three -tier architecture.	7	CO1	L1,L2
c)	Explain Design considerations for mobile computing.	6	CO1	L2
	OR			
2 a)	Write brief notes on: i. CC/PP ii. Policy manager iii. Security manager .	8	CO1	L2
b)	What are the different tiers in three-tier architecture.	6	CO1	L2
c)	What are the difference between middle ware and gateways.	6	CO1	L2
	Unit - 2			
3 a)	Explain the GSM architecture with its constituent elements.	8	CO2	L1,L3
b)	Explain the difference between SM MT and SM MO.	5	CO2	L1
c)	Explain the following a. Operation Centric Pull b. Operation Independent Push	7	CO2	L2
	OR			
4 a)	Explain the functions of HLR and VLR in call routing and roaming.	8	CO2	L2
b)	Explain the following in brief in the context of GSM networks i. Mobile station ii. NSS iii. BSS iv. OSS v. IMEI	12	CO2	L1,L2
	Unit - 3			
5 a)	Explain the WAP application environment.	8	CO3	L1
b)	Explain each of the following in the context of GPRS network i. SGSN ii.GGSN iii.Channel coding	12	CO3	L1,L2
	OR			
6 a)	Explain the various limitations of GPRS.	7	CO3	L1
b)	Explain call routing in the context of GPRS networks.	5	CO3	L1
c)	Explain the GPRS architecture with its constituent elements.	8	CO3	L2
	Unit - 4			
7 a)	How is WLAN configured and managed.	6	CO4	L2
b)	How is WLL different from a cellular phone technology.	7	CO4	L1,L3
c)	What is the motivation for using WLL.	8	CO4	L1,L2
	OR			
8 a)	How are mobility and handoffs managed in WLAN.	10	CO4	L3
b)	Explain implementation of a WLL system	5	CO4	L3
c)	Explain HiperMAN.	5	CO4	L1
	Unit - 5			
9 a)	Describe the architecture of palm OS.	7	CO5	L2
b)	Describe the application life cycle in palm OS with an example.	8	CO5	L3
c)	Describe the memory management in Symbian OS.	5	CO5	L1,L2
	OR			
10 a)	Write a short notes on History of palm OS.	5	CO5	L1
b)	Describe the symbian OS application components.	3	CO5	L1
c)	Describe the symbian OS architecture.	12	CO5	L2

Course Title :Artificial Intelligence			
Course Code: P13CS754	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr	**Weightage :CIE:50% SEE:50%**		

Prerequisites:

1. Neural networks
2. Machine learning

Course Outcomes:

Upon successful completion of this course, the student shall be able to:

1. Understanding fundamental of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Examine the proficiency developing applications in an 'AI language', expert system shell, or data mining tools.
5. Demonstrate proficiency in applying scientific method to models of machine learning.

This course aims to: The course aims to provide a foundation in artificial intelligence techniques for planning, with an overview of the wide spectrum of different problems and approaches, including their underlying theory and their applications.

Course Content

Unit-1

Artificial Intelligence: Introduction : What is AI; Foundations of Artificial Intelligence; History of Artificial Intelligence; The state of Art;

Intelligent Agents: Agent and Environments; Good Behavior; The Nature of Environments; The Structure of Agents;

Problem-solving: Problem-solving agent; searching for solution; Uniformed search strategies;

Informed Search and Exploration: Informed search strategies; Heuristic functions; Online Search agents and unknown environment;

Constraint Satisfaction problems: Constraint satisfaction problems; Backtracking search for CSPs;

Adversarial search: Games; optimal decisions in Games; Alpha-Beta pruning;

12 Hours

Unit-2

Logical Agents: Knowledge-based agents**;** The wumpus world; Logic; propositional logic; Reasoning patterns propositional logic; Effective propositional interference; Agent based on propositional logic;

First-Order Logic: Representation revisited; Syntax and semantics of first order logic; Knowledge engineering in first order logic;

Interference in First-Order Logic: Propositional verses first-order interference; Unification and lifting; 10 Hours

Unit-3

Knowledge Representation: Ontological engineering; Categories and object; Action, situations and events; Mental events and mental objects; The internet shopping world; Reasoning system for categories; Reasoning with default information; Truth maintenance system;

Planning : The planning problems; Planning with state-space search; Planning graphs; Planning with propositional logic 10 Hours

Unit-4

Uncertainity: Acting under uncertainity; Interfernce using full joint distributions; Independence; Bayes's rile and its use;

Probabilistic Reasoning: Representing knowledge in an uncertain domain; The semantic of Bayesian networks; Efficient representation of conditional distribution; Exact interference in Bayesian network. 10 Hours

Unit-5

Learning: Forms of learning**;** Inductive learning; Learning decision tree; Ensemble learning; Computational learning theory 10 Hours

Text Books:

Stuard Russell and Peter Norvig, Artificial Intelligence. A Modern Approach, 2nd edition, Prentice Hall, Inc., 2013 (required).

Reference Books:

1) Elaine Rich, Kevin Knight: Artificial Intelligence,3rd Edition, Tata Mc Graw Hill,2009.
2) Nils.J,Nilsson: Principles of Artificial Intelligence, Elsevier,1980.

Course Title Arm Based System Design			
Course Code: P13CS755	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

1. Microprocessor
2. Computer architecture

Course Learning Objectives :

1. Describe the programmer's model of ARM processor and create and test assembly level programming.
2. Analyze various types of coprocessors and design suitable co-processor interface to ARM processor.
3. Analyze floating point processor architecture and its architectural support for higher level language.
4. Understand the concepts of Thumb mode of operation of ARM.
5. Identify the architectural support of ARM for operating system and analyze the function of memory Management unit of ARM.

Course Content

UNIT -1

An Introduction to Processor Design: Processor architecture and organization. Abstraction in hardware design. A simple processor. Instruction set design. Processor design trade-offs. The Reduced Instruction Set Computer. Design for low power consumption.

The ARM Architecture: The Acorn RISC Machine. Architectural inheritance. The ARM programmer's model. ARM development tools. 10 Hours

UNIT -2

ARM Assembly Language Programming

Data processing instructions**,** Data transfer instructions. Control flow instructions. Writing simple assembly language programs.

ARM Organization and Implementation: 3-stage pipeline ARM organization,5-stage pipeline ARM organization. ARM instruction execution. ARM implementation. The ARM coprocessor interface 10 Hours

UNIT -3

The ARM Instruction Set: Introduction. Exceptions. Conditional execution. Branch and Branch with Link (B,BL) Branch, Branch with Link and exchange instructions (BX, BLX). Software Interrupt (SWI). Data processing instructions. Multiply instructions. Count leading zeros (CLZ - architecture v5T only). Single word and unsigned byte data transfer instructions. Half-word and signed byte data transfer instructions. Multiple register transfer instructions. Swap memory and register instructions (SWP). Status register to general register transfer instructions. General register to status register transfer instructions. Coprocessor instructions. Coprocessor data operations. Coprocessor data transfers. Coprocessor register transfers. Breakpoint instruction (BRK - architecture v5T only). Unused instruction space. Memory faults. ARM architecture variants.

Architectural Support for High-Level Languages: Abstraction in software design. Data types. Floating-point data types. The ARM floating-point architecture. Expressions . Conditional statements. Loops. Functions and procedures. Use of memory. Run-time environment. 10 Hours

UNIT -4

The Thumb bit in the CPSR: The Thumb programmer's model. Thumb branch instructions. Thumb software interrupt instruction Thumb data processing instructions. Thumb single register data transfer instructions. Thumb multiple register data transfer instructions. Thumb breakpoint instruction. Thumb implementation. Thumb applications. Architectural Support for System Development

Architectural Support for System Development: The ARM memory interface**,** The Advanced Microcontroller Bus Architecture (AMBA). The ARM reference peripheral specification. Hardware system prototyping tools. The JTAG boundary scan test architecture. The ARM debug architecture. 12 Hours

UNIT-5

ARM Processor Cores: ARM7TDMI. ARM8. ARM9TDMI.ARM10TDMI **Memory Hierarchy:** Memory size and speed. On-chip memory. Memory management.

Architectural Support for Operating Systems: An introduction to operating systems. The ARM system control coprocessor. CP15 protection unit registers. ARM protection unit. CP15 MMU registers. ARM MMU architecture. Synchronization. Context switching. Input/Output. 10 Hours

Text Book:

1. Steve Furber: ARM System on Chip Architecture by S.B Furber 2nd Edition, Pearson 2013.

Reference Book.

1. Joseph Yiu: The definitive guide to ARM Cortex M3 M4 processors, Elsevier Newnes 3rd edition 2014

Course Outcomes:

The students shall able to:

1. **Understand t**he hardware and software issues related to the design of a Microcontroller based system catering to the needs of medium and higher end applications.
2. **Design** 3-stage pipeline and 5-stage pipeline ARM organization.
3. **Understand** the architecture and programming of the 32-bit ARM Cortex Processors.
4. **Write** an ARM programming using Thumb mode of operation of ARM
5. **Analyze** the function of memory Management unit of ARM.

ELECTIVE – III

Course Title Big Data Analytics			
Course Code: P13CS761	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr	**Weightage :CIE:50% SEE:50%**		

Prerequisites:
Student should have knowledge of basic computer architecture, operating systems, hadoop, java, networking, and databases.

Course Learning Objectives (CLO's)
1. Analyze several key technologies used in manipulating, storing, and analyzing big data.
2. Acquire clear understanding of R & Hadoop.
3. Acquire clear understanding of Integrating R & Hadoop and Acquire clear understanding of Hadoop Streaming and its importance.
4. Manage Big Data and analyze Big Data.
5. Apply tools and techniques to analyze Big Data.

Relevance of the Course:
This course aims to provide a comprehensive learning on big data technology, which will enable you to make more informed decisions in an increasingly complex IT environment and builds a strong understanding of underlying R and machine learning technologies .

Course Content

Unit 1

INTRODUCTION TO BIG DATA
Big Data and its Importance – Four V's of Big Data – Drivers for Big Data –Introduction to Big Data Analytics – Big Data Analytics applications, Architecture Components, Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting, Big Data and Single View of Customer/Product, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines. 10 Hours

Unit 2

INTRODUCTION TO R & HADOOP
Getting Ready to Use R and Hadoop , Installing R ,Installing R Studio, Understanding the features of R language, Installing Hadoop, Understanding Hadoop features ,Learning the HDFS and MapReduce architecture ,Writing Hadoop MapReduce Programs, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals, Writing a Hadoop MapReduce example ,Learning the different ways to write Hadoop MapReduce in R. 10 Hours

Unit 3

INTEGRATION OF R & HADOOP
Integrating R and Hadoop ,Introducing RHIPE ,Understanding the architecture of RHIPE Understanding RHIPE samples, Understanding the RHIPE function reference, Introducing R Hadoop ,Understanding the architecture of RHadoop, Understanding RHadoop examples, Understanding the RHadoop function reference. HADOOP STREAMING WITH R Using Hadoop Streaming with R - Introduction, Understanding the basics of Hadoop Streaming, Understanding how to run Hadoop streaming with R, Understanding a MapReduce application, Exploring the Hadoop Streaming R package. 12 Hours

Unit 4

DATA ANALYTICS WITH R AND HADOOP

Understanding the data analytics project life cycle – Introduction, Identifying the problem, Designing data requirement ,Preprocessing data ,Performing analytics over data ,Visualizing data, Understanding data analytics problems ,Exploring web pages categorization Case Studies: Computing the frequency of stock market change , Predicting the sale price of blue book for bulldozers. 10 Hours

Unit 5

UNDERSTANDING BIG DATA ANALYSIS WITH MACHINE LEARNING

Introduction to machine learning, Types of machine-learning algorithms ,Supervised machine- learning algorithms, Unsupervised machine learning algorithm, Recommendation algorithms, Steps to generate recommendations in R ,Generating recommendations with R and Hadoop. 10 Hours

Text Books :

1. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012 (Chapter 1,2,3 Unit 1)
2. Big Data Analytics with R and Hadoop, Vignesh Prajapati, -Packt Publishing 2013 (Chapters 1,2,3,4,5,6 Unit 2,3,4,5,6)

Reference Books:

1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.
3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Course Outcomes:

1. Analyze several key technologies used in manipulating, storing, and analyzing big data.
2. Acquire clear understanding of R & Hadoop.
3. Acquire clear understanding of Integrating R & Hadoop and Acquire clear understanding of Hadoop Streaming and its importance.
4. Manage Big Data and analyze Big Data.
5. Apply tools and techniques to analyze Big Data.

Model Question Paper:

Q. No	Questions	Marks	CO's	Levels
	Unit - 1			
1 a)	Describe Four V's of Big Data .	7	CO1	L1, L2
b)	Discuss the Drivers for Big Data .	7	CO1	L2
c)	Discuss in detail the Big Data Analytics applications .	6	CO1	L3
	OR			
2 a)	Describe what are Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines .	6	CO1	L2
b)	Discuss about Big Data and Single View of Customer/Product .	8	CO1	L1
c)	Explain Unstructured Data Analytics and Reporting .	6	CO1	L3
	Unit - 2			
3a)	Describe the different ways to write Hadoop MapReduce in R	9	CO2	L2,L2
b)	Explain how to Install Hadoop .	6	CO2	L3
c)	Explain how to Install RStudio	5	CO2	L3
	OR			
4 a)	Discuss in detail HDFS and MapReduce architecture .	10	CO2	L3
b)	Discuss in detail the features of R language .	10	CO2	L2
	Unit - 3			
5a)	Discuss in detail how to Integrate R and Hadoop .	10	CO3	L1,L2
b)	Explain the R Hadoop function .	10	CO3	L6
	OR			
6) a)	Explain the basics of Hadoop Streaming	10	CO3	
b)	Explain the MapReduce application	10	CO3	L1,L2
	Unit - 4			
7 a)	Discuss in detail data analytics project life cycle .	10	CO4	L2
b)	Explain the process of Analyse the data and Visualizing data.	10	CO4	L2
	OR			
8 a)	Describe in detail the web pages categorization.	10	CO4	L3
b)	Considering the case study bringout the Analysis about Predicting the sale price of blue book for bulldozers .	10	CO4	L1,L2
	Unit - 5			
9 a)	Discuss what is machine learning .	10	CO5	L1,L2
b)	Explain the different machine-learning algorithms .	10	CO5	L1,L2
	OR			
10 a)	Discuss the Steps to generate recommendations in R	7	CO5	L2
b)	Explain what is Supervised machine-learning algorithms	6	CO5	L3
c)	Explain what is Unsupervised machine learning algorithm .	7	CO5	L2

Course Title : Digital Image Processing			
Course Code: P13CS762	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

1. Multimedia computing
2. Elementary mathematics

Relevance of the course:

Some of the major fields in which digital image processing is widely used are mentioned below

1. Image sharpening and restoration
2. Medical field
3. Remote sensing
4. Transmission and encoding
5. Machine/Robot vision
6. Color processing
7. Pattern recognition
8. Video processing
9. Microscopic Imaging

Course Learning Objectives (CLOs)

This course aims to

1. To understand the image fundamentals.
2. To understand the mathematical transforms necessary for image processing and to study the image enhancement techniques.
3. To understand the image degradation/restoration model and different noise models.
4. To understand the uses of pseudo colors and to study the image compression models.
5. To understand Morphological Image Processing and the image segmentation.

Course Content

Unit 1

Digital Image Fundamentals: What is Digital Image Processing, fundamental Steps in Digital Image Processing, Components of an Image processing system, Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations. 10 Hours

Unit 2

Image Enhancement in Spatial domain: Some Basic Gray Level Trans– formations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations.

Image Enhancement In Frequency Domain: Introduction to the Fourier transform, smoothing frequency domain filters, sharpening frequency domain filters. 11 Hours

Unit 3

Image Restoration: Model of image degradation/restoration process, noise models, Restoration in the Presence of Noise, Only– Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position– Invariant Degradations, inverse filtering, minimum mean square error (Weiner) Filtering 11 Hours

Unit 4

Color Image Processing: Color fundamentals, color models, pseudo color Image processing, basics of full color image processing, color transformations.

Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory 10 Hours

Unit 5

Morphological Image Processing: Dilation and Erosion, opening and closing, Some Morphological algorithms.

Image Segmentation

Detection of discontinuities, Edge Linking and Boundary Detection, Thresholding, Region–Based Segmentation. 10 Hours

TEXT BOOK:

1. "Digital Image Processing", Rafael C. Gonzalez and Richard E. Woods Pearson Education, 2009, 3rd edition.

REFERENCE BOOKS:

1. "Fundamentals of Digital Image Processing", Anil K. Jain, Pearson Edition, 2001.
2. "Digital Image Processing", S. Jayaraman and others.

Course Learning Outcome

After learning all the units of the course, the student is able to

1 Describe the various steps in image processing.
2 Develop the suitable filters for image enhancement.
3 Analyze the image degradation restoration model and noise models.
4 Apply the color image processing techniques.
5 Develop the algorithms for image segmentation and Morphological image processing.

Course Title Wireless Sensor Networks			
Course Code: P13CS763	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr	**Weightage :CIE:50% SEE:50%**		

Prerequisites: Data Communication and Computer Networks

Course Learning Objectives

The students should be able to

1. **Explain** the sensor network technology for various application setups.
2. **Analyze** the design and conduct trade-off analysis between performance and resources.
3. **Illustrate** suitable medium access protocols and radio hardware.
4. **Describe** the different transport control mechanisms and middle wares in WSN
5. **Explain** the localization and topology control.

Relevance of the Course: This course has been introduced to the students **to** learn the basic-to-advance concepts of Wireless Sensor Networks. WSN has become an emerging field in research and development due to the large number of applications. As WSNs can be applied in industry, agriculture, military defense, environment monitoring, remote control and city management etc., WSNs are becoming more and more popular. Students will be exposed and have knowledge of the hardware and the software components of WSN so that they can develop a monitoring and control system as a project.

Course content

Unit 1

Overview Of Wireless Sensor Networks: The vision of Ambient Intelligence, Application examples, Types of applications, Challenges for WSNs, Why are sensor networks different?, Enabling technologies for wireless sensor networks Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Architectures: **Single-Node Architecture** - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Some examples of sensor nodes.

10 Hours

Unit 2

Network Architecture: Sensor Network Scenarios, optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs, Gateway Concepts. **Physical Layer** - Wireless channel and communication fundamentals, Physical layer and transceiver design considerations in WSNs

10 Hours

Unit 3

MAC protocols - Fundamentals of (wireless) MAC protocols, Low duty cycle protocols and wakeup concepts, Contention-based protocols, Schedule-based protocols, The IEEE 802.15.4 MAC protocol, How about IEEE 802.11 and Bluetooth**?. Link-layer protocols** - tasks and requirements, Error control, Framing, Link management.

11 Hours

Unit 4

Routing protocols: The many faces of forwarding and routing, Gossiping and agent-based unicast forwarding, Energy-efficient unicast, Broadcast and multicast, Geographic routing, Mobile nodes, Data aggregation 10 Hours

Unit 5

Localization and positioning: Properties of localization and positioning procedures, Possible approaches: Proximity , Trilateration and triangulation, Scene analysis, Single-hop localization - Overlapping connectivity, Approximate point in triangle, Positioning in multi-hop environments, Impact of anchor placement, **Topology control**: Motivation and basic ideas, Controlling topology in flat networks – Power control: Some example constructions and protocols - The relative neighborhood graph, Spanning tree–based construction, Hierarchical networks **:** Some ideas from centralized algorithms, Some distributed approximations. 11 Hours

Text Books:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for WirelessSensor Networks", John Wiley, 2011

Reference Books:

1. Ian F. Akyildiz, Mehmet Can Vuran "Wireless Sensor Networks", Wiley 2010
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Kazem sohraby, Daniel minoli, Taieb znati, “Wireless Sensor Networks: Technology, Protocols and Applications:, WILEY , Second Edition (Indian) , 2014.

Course Outcome

The Students should be able to

1. **Explain** the fundamental concepts of WSN and its applications.
2. **Explain** basic technologies and systems.
3. **Choose** suitable MAC and routing algorithm and for wireless sensor actuator network.
4. **Implement** the elements of distributed computing and network protocol for an application.
5. **Suggest** suitable hardware and software platforms for a application to setup sensor networks.

Model Question Paper
Wireless Sensor Networks (Elective)

Time:3 hrs **Max.Marks:100**

Note: *Answer Five full questions selecting ONE full question from question from each Unit*

	UNIT – I	Marks	CO's	Levels
1 a	List and explain any five the characteristics that are shared among most of the applications.	**10**	**CO1**	**L1**
b	Explain the mechanisms that form typical parts of WSN**.**	**10**	**CO1**	**L4**
2 a	What is transceiver? List the characteristics of a transceiver and explain any 4 of them.	**10**	**CO1**	**L1&L4**
b	Explain inadequate programming models for WSN operating system with a neat diagram**.**	**10**	**CO1**	**L4**
	UNIT II			
3 a	Explain types of mobility for a sensor network.	**6**	**CO2**	**L2**
b	Discuss the different optimization goals and figures of merit for a WSN.	**14**	**CO2**	**L6**
4 a	List and explain the basic wave propagation phenomena	**10**	**CO2**	**L2**
b	Discuss the different synchronization problems that are associated with receivers in WSN.	**10**	**CO2**	**L6**
	UNIT III			
5a	Describe the hidden terminal and exposed terminal problems in wireless networks	**10**	**CO3**	**L2**
b	. Differentiate between contention based protocols and schedule based protocols.	**10**	**CO3**	**L4**
6.a	Discuss how LEACH protocol is energy efficient protocol	**10**	**CO3**	**L6**
b	Explain the link management by the link layer protocol	**10**	**CO3**	**L2**
	UNIT IV			
7a	Explain in detail Gossiping and agent-based unicast forwarding	**10**	**CO4**	**L2**
b	Discuss how a unicast routing can be energy-efficient	10	**CO4**	**L6**
8a	Explain prim's minimum cost spanning tree algorithm for broad routing in WSN	**10**	**CO4**	**L6**
b	List and explain the different categories of aggregation operations and discuss their advantages and disadvantages	**10**	**CO4**	**L2 & L5**
	UNIT V			
9a	Define Localization. List and explain different Possible approaches to determine a node's position	**8**	**CO5**	**L2**
9b	Three anchors with known positions (x, y_i), $i = 1, \ldots, 3$, and a node at unknown position (x_u, y_u), and perfect distance values r_i , $i = 1, \ldots, 3$ are given derive the expression to get the position of the unknown node. Using the derived equations compute the position of a node with 3 anchors at given position as $(x_1, y_1) = (2, 1)$, $(x_2, y_2) = (5, 4)$, and $(x_3, y_3) = (8, 2)$ with the distances between anchors and node of unknown position $r_1 = \sqrt{10}$, $r_2 = 2$, $r_3 = 3$.	**12**	**CO5**	**L6**
10 a	Define topology control. Explain the different approach to the problem of topology control.	**10**	**CO5**	**L2 & L4**
b	Define Critical Transmitting Range (CTR) and explain the different methods to fix CTR.	**10**	**CO5**	**L2**

Course Title :Network Management Systems			
Course Code: P13CS764	**Semester : VII**	**L-T-P: 4:0:0**	**Credits:4**
Contact Period : Lecture :52 Hr, Exam: 3Hr	**Weightage :CIE:50% SEE:50%**		

Prerequisites
1. Computer networks
2. Distributed computing systems

Course Objectives:
1. To introduce the analogy of distributed networks and architectures for network installation and maintenance .
2. To introduce basic concepts of functionality of object and data types
3. To determine the functional aspects of SNMP management and standards of Internet
4. To classify token, remote monitoring and RMON .
5. Understanding the broadband network management. To play a role with network manage interface
6. Identifying key aspects of authorization and authentication and account management

Course Content

Unit 1

Introduction: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments; TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards Communication Architectures. Protocol Layers and Services: Base Histories of Networking and Management The Importance of topology, Filtering Does Not Reduce Load on Node, Slope Common Network Problems;. Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

Basic Foundations: Standards, Models, and Language :Network Management Standards, Network Management Model. Organization Model, Information Model Management Information Trees. 9 Hours

Unit 2

Managed Object Perspectives Communication Model; ASNl Terminology, Symbols, and. Conventions. Objects and Data Types. Object Names, An Example of ASN.l from ISO 8824; Encoding Structure; Macros, Functional Model

SNMPv1 Network Management - 1 : Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, and System Overview.

SNMPv1 Network Management - 2 : The Information Model - Introduction. The Structure of Management Information, Managed Objects. Management Information Base. The SNMP Communication Model-The SNMP Architecture, Administrative Model, SN.MP Specifications. SNMP Operations, SNMP MIB Group; Functional Model. 10 Hours

Unit 3

SNMP Management - RMON : Remote Monitoring, RMON SMI and MIB, RMONI1-RMON1 Textual Conventions. RMONI Groups and Functions. Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token. Ring Extension groups RMON2 - The RMON2 Management Information Base, RMON2 Conformance Specifications; ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON.

Broadband Network Management: ATM Networks: Broadband Networks and Services, ATM Technology Virtual Path-Virtual Circuit,TM Packet Size, Integrated Service, SONET, ATM LAN Emulation, Virtual- LAN: ATM Network Management - The ATM Network Reference Model, The integrated Local Management Interface. The ATM Management Information Base. The Role of SNMP and ILMI in Arm Management, M1 Interface: Management of ATM Network Element, M2 Interface: Management of Private Networks. M3 Interface: Customer Network Management of Public Networks, M4 Interface: Public Network Management of LAN Emulation, ATM Digital Exchange Interface Management

12 Hours

Unit 4

Broadband Network Management : Broadband Access Networks and Technologies Broadband Access Networks, broadband Access Technology; HFCT Technology The Broadband LAN. The Cable Modem. The Cable Modem Termination System. The HFC Plant. -The RF Spectrum for Cable Modem: Data Over Cable Reference Architecture: HFC Management- Cable Modem and CMTS Management, lIFC Link Management, RF Spectrum Management. DSL Technology; Asymmetric Digital Subscriber Line Technology - Role of the ADSL Access Network in an Overall Network, ADSL Architecture; ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management -ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management. ADSL Performance Management SNMP-Based ADSL Line MIB. MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles. 11 Hours

Unit 5

Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault. Detection, Fault Location and Isolation Techniques, Performance Management Performance Metrics, Data Monitoring: Problem Isolation, Performance Statistics; Event Correlation Techniques - Rule-Based Reasoning, Model-Based Reasoning, Case-Based Reasoning, Codebook correlation Model. State Transition Graph Model, Finite State Machine Model, Security Management - Policies and Procedures. Security ·Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography. Authentication and Authorization, Client/Server Authentication Systems,. Messages Transfer Security, Protection of Networks from Virus Attacks. Accounting Management. Report Management. Policy-Based Management, Service; Level Management. 10 hours

Text Book:

1. Mani Subramanian : Network Management – Principles and Practice, 2nd Edition, Pearson Education 2012

Reference Book :

1. J.Richard Burke : Network Management Concepts and Practices A Hands-On Approach PHI 2008

Course Outcomes :

On successful completion of the course students will be able to:

1. Analyse the issues and challenges pertaining to management of emerging network technologies and apply network management standards to manage practical networks.
2. Use SNMP v1 for managing the network
3. Demonstrate the features of SNMP v2 and use RMON for monitoring the behavior of the network
4. Explain telecommunication network standards and identify different network management applications.
5. Implement broadband network and learn advanced management topics.

Course Title :Web 2.0 and Rich Internet Applications			
Course Code: P13CS765	**Semester : VII**	**L-T-P: 4:0:0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

- Computer networks
- Web technologies

Course Learning Objectives (CLOs)

This course aims to

1. Describe the benefits of using Ajax in Web application development
2. Describe the technical architecture for Ajax applications
4. Describe the use of JavaScript, XML, and Web services in Ajax applications
5. Apply Ajax techniques to enhance the responsiveness and interaction of Webpages
6. Compare and contrast the different mechanisms to transfer data between client and server
1. in Ajax applications
7. Leverage JavaScript Object Notation (JSON) as a lightweight data format
8. Building Applications with the Flex Framework

Course Content

Unit 1

Introduction, Web Services Folksonomies and Web 2.0, Software As a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP, WSDL, REST services, JSON format, What is JSON?, Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding, JSON versus XML

11 Hours

Unit 2

Building Rich Internet Applications with AJAX Building Rich Internet Applications with AJAX: Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX, Dynamic web applications through Hidden frames for both GET and POST methods. IFrames, Asynchronous communication, AJAX application model. 10 Hours

Unit 3

XMLHTTP objects XMLHTTP Object – properties and methods, handling different browser implementations of XMLHTTP, The same origin policy, Cache control, AJAX Patterns (Only algorithms – examples not required), Submission throttling pattern, Periodic refresh, Multi stage download, Fall back patterns, Predictive fetch pattern 10 Hours

Unit 4

Building Rich Internet Applications with Flex Flash player, Flex framework, MXML and Actionscript, Working with Data services, Understanding differences between HTML and Flex applications, Understanding how Flex applications work, Understanding Flex and Flash authoring, MXML language, a simple example. Using Actionscript, MXML and Actionscript correlations. Understanding Actionscript 3.0 language syntax: Language overview, Objects and Classes, Packages and namespaces, Variables & scope of variables, case sensitivity and general syntax rules, Operators, Conditional, Looping, Functions, Nested functions, Functions as Objects, Function scope, OO Programming in Actionscript: Classes, Interfaces,

Inheritance, Working with String objects, Working with Arrays, Error handling in Actionscript: Try/Catch, Working with XML Framework fundamentals, Understanding application life cycle, Differentiating between Flash player and Framework, Bootstrapping Flex applications, Loading one flex application in to another, Understanding application domains, Understanding the preloader., Working with children, Container types, Layout rules, Padding, Borders and gaps, Nesting containers, Making fluid interfaces, Managing layout, Flex layout overview 11 Hours

Unit 5

Working with UI componenets Working with UI components: Understanding UI Components, Creating component instances, Common UI Component properties, Handling events, Button, Value selectors, Text components, List based controls, Data models and Model View Controller, Creating collection objects, Setting the data provider, Using Data grids, Using Tree controls, Working with selected values and items, Pop up controls, Navigators, Control bars Working with data: Using data models, Using XML, Using Action script classes, Data Binding 10 Hours

Text Books:

1. Nicholas C Zakas et al: Professional AJAX, Wrox publications, 2006.
2. Chafic Kazoun: Programming Flex 2, O'Reilly publications, 2007.
3. Francis Shanahan: Mashups, Wrox, 2007.

Reference Books:

1. Thomas A. Powel: Ajax The Complete reference, McGraw Hill, 2008.
2. Gottfried Vossen, Stephan Hagemann: Unleashing Web 2.0 From Concepts to Creativity, Elsevier, 2007.
3. Colin Moock: Essential Action script 3.0, O'Reilly Publications, 2007.

Course outcomes :

On successful completion of the course students will be able to:

1. Introduced to web services such as SOAP, RPC style SOAP, Document style SOAP, WSDL, REST services.
2. Introduced to AJAX and various AJAX pattern
3. Understanding XMLHTTP objects
4. Design internet applications with flex, flash player, MXML, Action Script.
5. Understanding of OO design and UI components.
6. Design advanced web applications using AJAX, flex and mash up techniques

8th SEMESTER

Course Title : Cryptography & Network Security			
Course Code: P13CS81	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits:3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites
1. Computer networks
2. Network management system

Course Objective: The student should be able
1. To Define Three Security goals, to define security services and how they are related to the three security goals, to review integer arithmetic, modular arithmetic.
2. To review short history of DES, define the basic structure of DES, to define the basic structure of AES.
3. To introduce prime numbers and their applications in cryptography, to discuss some primarily test algorithm to describe CRT and its application, to discus RSA system.
4. To explain need for KDC, to describe kerbores as a KDC, to discuss how PGP can provide security services for email.
5. To discuss the need for security services at the transport layer of the internet model, to discuss the application of IPSec in transport and tunnel modes.

Course Content

UNIT 1

Introduction: Security goals, Cryptographic Attacks, Services and Mechanism , technique **Mathematics of Cryptography**: Integer Arithmetic, Modular Arithmetic, Matrices **Traditional Symmetric-Key Ciphers**: Introduction , Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers 11 Hours

UNIT 2

Data Encryption Standard: Introduction, DES Structure, DES Analysis, Security of DES, IDEA **Advanced Encryption Standard**: Introduction ,Transformations ,Key Expansion, Analysis of AES. 11 Hours

UNIT 3

Mathematics of Asymmetric Key Cryptography: Primes, Primality testing, Factorization, Cinese remainder theorem, **Asymmetric key cryptography**: RSA Cryptosystem, Rabin Cryptosystem, Message Authentication 11 Hours

UNIT 4

Key management: Symmetric Key Distribution, Kerberos, Symmetric Key Agreement, **Security at the Application Layer**: Email, PGP: scenarios, key rings, PGP certificate, Trust model in PGP, PGP Packet, PGP Messages ,S/MIME:MIME,S/MIME. 10 Hours

UNIT 5

Security at the Transport Layer : SSL Architecture, Services, Key Exchange Algorithm, Encryption/Decryption Algorithm, Hash Algorithm SSL Message Formats, **Security At the Network Layer:** Two Modes, Two Security Protocols, ISAKMP 10 Hours

TEXT BOOK::

1. Behrouz A. Forouzan and Debdeep Mukhopadhyay, "Cryptography and Network Security", 2nd Edition, McGrawHill Education, 2014.

REFERENCES:

1. Cryptography and Network Security: Principles and Practice , 2013 by William Stallings
2. **Cryptography and Network Security (UPTU) Paperback – 2012 by V S Bagad and I A Dhotre**

Course Outcomes:

1. **Understand** the importance of security attacks and service mechanism
2. **Explain** basic structure of DES and AES
3. **Understand** importance of Primes, Primality testing, Factorization, Cinese remainder theorem and RSA Cryptosystem,
4. **Explain** the concept of Kerbores, Symmetric Key Agreement, PGP,S/MIME.
5. **Understand** SSL Architecture , Hash Algorithm SSL Message Formats, ISAKMP

Course Title :Internet of Things			
Course Code: P13CS82	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites
1. Microcontrollers
2. Embedded systems

Course Objectives:
1. To learn about Home Area Networking, Building Automation and AMI protocols.
2. To understand the evolution towards open protocols based on IP such as 6LowPAN and ETSI M2M.
3. To understand the approach taken by service providers to interconnect the protocols and solve the challenge of massive scalability of machine-to-machine communication for mission-critical applications.
4. To learn the next generation machine-to-machine ETSI M2M architecture.
5. To know how the next generation utilities, by interconnecting and activating our physical environment, will be able to deliver more energy with less impact on our natural resources.

Course Content

Unit 1

M2M Area Network Physical Layers : IEEE 802.15.4 - The IEEE 802 Committee Family of Protocols, The Physical Layer, The Media-Access Control Layer, Uses of 802.15.4, The Future of 802.15.4: 802.15.4e and 802.15.4g

Power line Communication for M2M Applications - Overview of PLC Technologies, PLC Landscape, Power line Communication: A Constrained Media, The Ideal PLC System for M2M, Conclusion.

Legacy M2m Protocols for Sensor Networks, Building Automation and Home Automation : The BACnetTM Protocol - Standardization, Technology, BACnet Security, BACnet Over Web Services. 10 Hours

Unit 2

The LonWorks R Control Networking Platform – Standardization, Technology, Web Services Interface for LonWorks Networks: Echelon Smart Server, A REST Interface for LonWorks

ModBus – Introduction, ModBus Standardization, ModBus Message Framing and Transmission Modes, ModBus / TCP

KNX 83 - The Konnex / KNX Association, Standardization, KNX Technology Overview, Device Configuration

ZigBee - Development of the Standard, ZigBee Architecture, Association, The ZigBee Network Layer, The ZigBee APS Layer, The ZigBee Device Object (ZDO) and the ZigBee Device Profile (ZDP), ZigBee Security, The ZigBee Cluster Library (ZCL), ZigBee Application Profiles, The ZigBee Gateway Specification for Network Devices

10 Hours

Unit 3

Z-Wave - History and Management of the Protocol, The Z-Wave Protocol

Legacy M2m Protocols For Utility Metering : M-Bus and Wireless M-Bus - Development of the Standard, M-Bus Architecture, Wireless M-Bus
The ANSI C12 Suite – Introduction, C12.19: The C12 Data Model, C12.18: Basic Point-to-Point Communication Over an Optical Port, C12.21: An Extension of C12.18 for Modem Communication, C12.22: C12.19 Tables Transport Over Any Networking Communication System, Other Parts of ANSI C12 Protocol Suite, RFC 6142: C12.22 Transport Over an IP Network, REST-Based Interfaces to C12.19
DLMS / COSEM - DLMS Standardization, The COSEM Data Model, The Object Identification System (OBIS), The DLMS / COSEM Interface Classes, Accessing COSEM Interface Objects, End-to-End Security in the DLMS / COSEM Approach

11 Hours

Unit 4

The Next Generation: IP-Based Protocols
LoWPAN and RPL- Overview, What is 6LoWPAN? 6LoWPAN and RPL Standardization, Overview of the 6LoWPAN Adaptation Layer, Context-Based Compression: IPHC, RPL, Downward Routes, Multicast Membership, Packet Routing
ZigBee Smart Energy 2.0 - REST Overview, ZigBee SEP 2.0 Overview, Function Sets and Device Types, ZigBee SE 2.0 Security
The ETSI M2M Architecture - Introduction to ETSI TC M2M, System Architecture, ETSI M2M SCL Resource Structure, ETSI M2M Interactions Overview, Security in the ETSI M2M Framework, Interworking with Machine Area Networks, Conclusion on ETSI M2M

12 Hours

Unit 5

Key Applications of The Internet of Things : The Smart Grid – Introduction, The Marginal Cost of Electricity: Base and Peak Production, Managing Demand: The Next Challenge of Electricity Operators and Why M2M Will Become a Key Technology, Demand Response for Transmission System Operators (TSO), Case Study: RTE in France, The Opportunity of Smart Distributed Energy Management, Demand Response: The Big Picture, Conclusion: The Business Case of Demand Response and Demand Shifting is a Key Driver for the Deployment of the Internet of Things
Electric Vehicle Charging - Charging Standards Overview, Use Cases, Conclusion

09 Hours

Text Book:

1. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

References:

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
4. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012

Course Outcomes:

At the end of this course the students will be able to:

1. Identify the components of IOT
2. Design a portable IOT using appropriate boards
3. Program the sensors and controller as part of IOT
4. Develop schemes for the applications of IOT in real time scenarios
5. Model the Internet of things to business

ELECTIVE – IV

Course Title :Real Time Systems			
Course Code: P13CS831	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage : CIE:50% SEE:50%**	

Prerequisites
1. Operating systems
2. Distributed computing systems

Course Objectives

The course aims to gain knowledge on:
1. Real-Time systems, modeling and Design of Real-Time Systems.
2. Task scheduling,
3. Resource management and Resource access control.
4. Hardware Issues
5. Real-time operating systems and Memory Management

Course content

Unit -1

Hard versus Soft Real Time Systems: Jobs and Processors, Release Times, Deadlines and timing constraints, Hard and soft timing constraints, Hard real time systems and soft real time systems.

A reference model of real time systems: Processors and resources, temporal parameters of real time workload, periodic task model, precedence constraints and data dependency, other type dependencies, functional parameters, resource parameters of jobs and parameters of resources, scheduling hierarchy.

Commonly used approaches to real-time scheduling: Clock driven approach, Weighted Round Robin approach, Priority driven approach, Dynamic versus static systems, Effective release times and deadlines. Optimality of EDF and LST algorithms, on optimality of the EDF and LST algorithms. 10 Hours

Unit -2

Clock Driven Scheduling: Notations and assumptions, Static, Time-driven Scheduler**,** General structure of cyclic schedules, Cyclic Executives, Improving average response time of A periodic jobs, Scheduling sporadic jobs, Algorithms for constructing static schedules, Pros and cons of clock driven scheduling.

Priority scheduling for periodic tasks: Static assumption, Fixed versus dynamic priority algorithms, Maximum schedulable utilization, Optimality of the RM and DM algorithms, sufficient schedulability conditions for the RM and DM algorithms 10 Hours

Unit -3

Resources and Resource access control: Assumptions on resources and their usage, effects of resource and their usage, effects of resource contention and resource access control, Non-preemptive critical sections, Basic priority –inheritance protocol, Basic priority-ceiling protocol, stack-based, priority-ceiling protocol, use of priority ceiling protocol in dynamic

priority systems, preemption-ceiling protocol, Controlling accesses to multiple-unit resources, controlling concurrent accesses to data objects.

Multiprocessor scheduling, resource access control, and synchronization: Model of multiprocessor and distributed systems, Task assignment, Multiprocessor priority-ceiling protocol. Elements of scheduling algorithms for end-to-end periodic tasks, Schedulability of fixed-priority end- to- end periodic tasks, End-to-end tasks in heterogeneous systems.

11Hours

Unit- 4

Real-Time communication: Model of real-time communication, Priority –based service disciplines for switched networks, weighted round robin service disciplines, medium access-control protocols of broadcast networks, internet and resource reservation protocols, real time protocol, communication in multicomputer system. 10 Hours

Unit -5

Operating Systems: Overview, Time services and scheduling mechanisms, other basic operating system functions, processor reserves and resource kernel, open system architecture, capabilities of commercial real time operating systems ,Predictability of general purpose operating system. 10 Hours

Text Books:

1. Liu, Jane W.S., Real Time Systems, Pearson Education, 2000.
2. Laplante, Phillip A., Real-Time Systems Design and Analysis, Wiley, 3rd Ed., 2004.

Course Learning Outcomes:

On successful completion of this course students will be able to:

1. Characterize real-time systems and describe their functions
2. Analyze, design and implement a real-time system
3. Apply formal methods to the analysis and design of real-time systems
4. Apply formal methods for scheduling real-time systems
5. Characterize and describe reliability and fault tolerance issues and approaches

Course Title: Decision Support Systems			
Course Code: P13CS832	**Sem: 8**	**L-T-P-H: 4:0:0:4**	**Credits 4**
Contact Period: Lecture: 52 Hrs., Exam: 3 Hrs		**Weightage: CIE:50; SEE:50**	

Prerequisites:

1. Should have knowledge regarding mathematical models, database systems, data mining, management science.
2. Should have knowledge on graphics techniques and programming techniques.

Course Learning Objectives (CLO's)

This course aims to:

1. **Provide** an overview of the foundations and key issues of managerial decision making.
2. **Describe** and **develop** the components and structure of each DSS components
3. **Understand** the different methodologies to develop decision support systems.
4. **Enable** the student to appreciate the role and nature of Group Decision Support Systems and related approaches such as Cognitive Mapping as a means of structuring and supporting complex unstructured decision problems with high levels of uncertainty.
5. **Understand** Enterprise Resource Packages, Supply Chain Management and Customer relationship management systems.

Relevance of the Course:

1. The course topics include factors leading to effective computerized support for decisions, characteristics of tasks amenable to computerized support, basic functional elements of a decision support system, the decision support lifecycle, and factors leading to successful integration of a DSS into an organization.
2. Support for distributed decision processes, support for time-critical decisions, and deals with how to refine and improve an organization's DSS development capability.
3. The course establishes a foundation for understanding and analysing information and information systems in organisations. It also provides an overview of technical and organisational aspects of decision support systems (DSS), including individual, group and organisational DSS as well as executive information systems (EIS). Management of DSS and EIS within the end-user computing environment is also discussed. The course is design-oriented and emphasises conceptual foundations of DSS and EIS.

Course Contents

Unit 1

Decision Making and Computerized Support-1:

Managers and Decision Making, Managerial-Decision Making and Information Systems, Managers and Computer Support, Computerized Decision Support and the Supporting technologies, A frame work for decision support, The concept of Decision Support systems, Group Decision Support Systems, Enterprise Information Systems, Knowledge Management systems, Expert Systems, Artificial Neural Networks, Hybrid Support Systems. Decision-Making Systems, Modeling, and Support: Introduction and Definitions, Systems, Models. Phases of Decision-Making Process, Decision-Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Choice Phase, Decision Making: Implementation Phase. 11 Hours

Unit 2

Decision Making and Computerized Support-2:

How decisions are supported, Personality types, gender, human cognition, and decision styles; The Decision –Makers. Decision Support Systems: An Overview DSS Configuration, What is DSS? Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, the Model Management Subsystem, The User Interface Subsystem, The Knowledge-Based Management Subsystem, the User, DSS Hardware, DSS Classification. 10 Hours

Unit 3

Decision Support Systems Development:

Introduction to DSS development, The Traditional System Development Life cycle, Alternate Development Methodologies, Prototyping: The DSS Development Methodology, DSS Technology Levels and Tools, DSS Development Platforms, DSS Development Tool Selection, Team-Developed DSS, End User-Developed DSS, Putting the System Together. 10 Hours

Unit 4

Group Support Systems:

Group Decision Making, Communication and Collaboration, Communication Support, Collaboration Support: Computer- Supported Cooperative work, Group Support Systems, Group Support Systems Technologies, Group Systems Meeting Room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation. 10 Hours

Unit 5

Enterprise Information Systems:

Concepts and definitions, Evolution of Executive and Enterprise Information Systems, Executive‘s roles and information needs, Characteristics and capabilities of Executive Support Systems, Comparing and integrating EIS and DSS, Supply and Value Chains and Decision Support, Supply Chain problems and solutions, MRP, ERP / ERM, SCM, CRM, PLM, BPM, and BAM. 11 Hours

Text Book :

1. Efraim Turban. Jay E. Aronson, Ting-Peng Liang: Decision Support Systems and Intelligent Systems, 7th Edition, Prentice-Hall of India, 2006.

Reference Book :

1. Sprague R.H. Jr and H.J. Watson: Decision Support Systems, 4th Edition, Prentice Hall, 1996.

Course outcomes (COs)

Upon completion of this course student will be able to,

1. **Illustrate** different types of Decision Making strategies, frame work for decision support.
2. **Describe** DSS characteristics, capabilities and configurations**.**
3. **Explain** DSS Development Methodology, DSS Technology Levels and Tools.
4. **Analyze** Group Decision Making, Communication and Collaboration, Communication Support.
5. **Describe** the evolution of Executive and Enterprise Information Systems, Executive‘s roles and information needs, Characteristics and capabilities of Executive Support Systems.

Model Question Paper				
UNIT-1				
SL.N	**Questions**	**Mark**	**CO's**	**Leve**
1.	Explain the various reasons needed f computerized decision support systems.	10	**Illustrate** different types of Decision Making strategies.	L2
2.	What is a model of a system? Explain th classification of models according to the degree of abstraction. Also explain why an MS uses models.	10		L1,L
UNIT-2				
3.	Explain the ideal characteristics and capabiliti of DSS.	10	**Describe** DSS characteristics	L2
4.	What are the various DSS classifications? Explain the various components of DSS.	10		L1,L
UNIT-3				
5.	Explain the various basic DSS development software platforms. What is team-develope DSS and end-user developed DSS.	10	**Explain** DSS Developme Methodology.	L4,L
6.	Explain the DSS technology levels and DS development tool selection.	10		L4
UNIT-4				
7.	Explain the different tools and their relationshi to the major group support system activities.	10	**Analyze** Group Decision Making	L4
8.	Explain the time/place communicatic framework and some collaborative computir support technologies.	10		L4
UNIT-5				
9.	Describe the desired characteristics and benefi of enterprise information systems(EIS).	10	**Describe** the evolution of Executive and Enterprise Information Systems.	L6
10.	Describe the MSS integration with ERP system SCM systems and KMS.	10		L6

Course Title : Business Intelligence & Applications			
Course Code: P13CS833	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

1. Computer networks
2. Business management system

Course Content

Unit 1

Introduction to Business Intelligence: Business enterprise organization, Its functions, and core business processes, Key purpose of using IT in business, The connected world: Characteristics of Internet-Ready IT Applications, Enterprise Applications, Introduction to digital data and its types – structured, semi-structured and unstructured.

Introduction to OLTP and OLAP:

On-Line Transaction Processing (OLTP) and On-Line Analytical Processing (OLAP): Different, OLAP architectures, OLTP and OLAP, Data models for OLTP and OLAP,

10 Hours

Unit 2

Role of OLAP tools in the BI architecture, OLAP performance directly on operational databases, A peek into the OLAP operations on multidimensional data, Leveraging ERP data using analytics. **Getting started with business intelligence:** Using analytical information for decision support, Information sources before dawn of BI, Business intelligence (BI) defined, Evolution of BI and role of DSS, EIS, MIS and digital dashboards, Need for BI at virtually all levels, BI for past, present and future, The BI value chain, Introduction to business analytics. 10 Hours

Unit 3

BI Definitions and concepts: BI Component framework, Need of BI, BI Users, Business Intelligence applications, BI Roles and responsibilities, Best practices in BI/DW, The complete BI professional, Popular BI tools.

Basis of data integration: Need for data warehouse, Definition of data warehouse, data mart, OSS, Raiph Kimball's approach vs. W.H.Inmon's approach, Goals of a data warehouse, constituents of a data warehouse, Extract, transform, load, data Integration, Data integration technologies, Data quality, Data profiling. 12 Hours

Unit 4

Multidimensional data modeling: Introduction, Data modeling basis, Types of data model, Data modeling techniques, Fact table, Dimension table, typical dimensional models, Dimensional modeling life-cycle, designing the dimensional model, Step-by-step lab guide to analyze data using MS Excel 2010

Measures, metrics, KPIs, and Performance management: Understanding measures and performance, Measurement system terminology, Navigating a business enterprise, role of metrics, and metrics supply chain, "Fact-Based Decision Making" and KPIs 10 Hours

Unit 5

KPI Usage in companies, business metrics and KPIs, Connecting the dots: Measures to business decisions and beyond

Basics of enterprise reporting: Reporting perspectives common to all levels enterprise, Report standardization and presentation practices, Enterprise reporting characteristics in OLAP world, Balanced scorecard, Dash boards and its creation, Scorecards vs. Dashboards, The buzz behind analysis, Step-by-step lab guide to create enterprise reports using MS Acess.

10 Hours

Text Books:

1. "Fundamentals of Business Analytics" – By R N Prasad and SeemaAcharya,Publishers: Wiley India.

Reference Books:

1 Larissa T Moss and Shaku Atre – Business Intelligence Roadmap : TheCompleteProject Lifecycle for Decision Support Applications, Addison WesleyInformation Technology Series

2 David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher:Morgan Kaufmann

3. Brian Larson - Delivering Business Intelligence with Microsoft SQL Server 2005,Mc Graw Hil

Course Title :Service Oriented Architecture			
Course Code: P13CS834	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites: Student should have knowledge of basic SOFTWARE architecture, Web Service systems, java language and databases.

Course Learning Objectives (CLO's)
The course aims to:
1. To gain understanding of the basic principles of service orientation.
2. To learn service oriented analysis techniques.
3. To learn technology underlying the service design.
4. To learn advanced concepts such as service composition, orchestration and Choreography.
5. To know about various WS-* specification standards.

Relevance of the Course:
This course aims to provide a comprehensive learning on service oriented system, which will enable you to make more informed decisions in an increasingly complex IT environment and builds a strong understanding of underlying patterns of architecture.

Course Content

Unit-1

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures –Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation.

10 Hours

Unit -2

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography- Service layer abstraction– Application Service Layer – Business Service Layer- Orchestration Service Layer**.** 12 Hours

Unit -3

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Taskcentric business service design. 9 Hours

Unit -4

SOA platform basics – SOA support in J2EE – Java API for XML-based web services JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) – Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms - ASP. NET web services – Web Services Enhancements (WSE) 12 Hours

Unit -5

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, SSecurity 9 Hours

Text Books:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2010.

Course Outcomes:

This course will enable students to:

1. Design, develop and test Web services.
2. Learn standards related to Web services: Web Services Description Language (WSDL), Simple Object Access Protocol (SOAP), and Universal Description, Discovery and Integration (UDDI).
3. Learn basic principles of Service-Oriented Architecture and apply these concepts to
4. develop a sample application
5. Conceptually model Web services and formulate specifications of them in the
6. Resource Description Framework (RDF) and the Web Ontology Language (OWL).
7. Learn approaches to compose services.
8. Evaluate emerging and proposed standards for the main components of Web services
9. architectures

Model Question Paper:

Q. No	Questions	Marks	CO's	Levels
	Unit - 1			
1 a)	Describe service oriented architecture leads to improvements in automated solution construction and benefiting the enterprise? Explain briefly.	7	CO1	L1, L2
b)	Define service role? What are the different fundamental services roles provided? Explain briefly	7	CO1	L2
c)	Describe with example how a standardized data representation format will reduce the complexity of some application.	6	CO1	L3
	OR			
2 a)	List and explain the (any10) common characteristics of contemporary SOA.	6	CO1	L2
b)	Discuss common tangible benefits of SOA.	8	CO1	L1
c)	Discuss the evaluation of SOA.	6	CO1	L3
	Unit - 2			
3a)	Explain the concept of addressing with respect to advanced messaging, metadata and security.	9	CO2	L2,L2
b)	What do you mean by reliable messaging? With the necessary diagrams and examples explain in detail.	6	CO2	L3
c)	Explain different primitive message exchange patterns?	5	CO2	L3
	OR			
4 a)	Discuss the terms and concepts expressed by the ws eventing specification.	7	CO2	L3
b)	List and define different parts of endpoint references and message information headers provided by ws-addressing.	6	CO2	L2
c)	List and explain different business activities that govern long running and complex service activities.	7	CO2	L3
	Unit - 3			
5a)	Discuss how the logical components of SOA establishes a level of enterprise logic abstraction and how these components inter relate in SOA.	5	CO3	L1,L2
b)	Explain Application service design.	10	CO3	L6
c)	Describe service modeling.	5	CO3	L3
	OR			
6a)	Explain the Taskcentric business service design.	8	CO3	L1
b)	Discuss in detail SOAP.	6	CO3	L1,L2
c)	Describe entity centric design.	6	CO3	L3
	Unit - 4			
7 a)	Discuss the SOA support in J2EE	6	CO4	L2
b)	Explain about Java API for XML.	6	CO4	L2
c)	Discuss how service are used in Web Services Interoperability Technologies.	8	CO4	L6
	OR			
8 a)	Explain Java architecture for XML binding.	7	CO4	L3
b)	Explain service oriented platform basics	7	CO4	L1,L2
c)	Discuss in detail Java API for XML based RPC (JAX-RPC) .	6	CO4	L2
	Unit - 5			
9 a)	Discuss in detail the WS-BPEL basics.	8	CO5	L1,L2
b)	Describe What are WS-Coordination.	6	CO5	L1,L2
c)	Discuss WS-Choreography.	6	CO5	L3
	OR			
10 a)	Discuss WS-Policy.	10	CO5	L2
b)	Discuss in detail about WS Security.	10	CO5	L3

Course Title :Information Theory and Coding			
Course Code: P13CS835	**Semester : VIII**	**L-T-P: 2:1:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage: CIE:50% SEE:50%**	

Prerequisites

1. Data communication
2. Data compression

Course Objective:

1. To introduce information theory, the fundamentals of error control coding techniques and their applications, and basic cryptography.
2. To introduce basic concepts of information content are developed and applied to the problems of compressing information by encoding.
3. Understand the noisy channel coding problem is addresses. Shannon's fundamental channel capacity results are derived and presented. These results are then used to assess the performance of both block and convolution coding schemes in different practical situations.
4. Afterwards, the course will consider error control coding techniques and applications.
5. Finally, the basic concepts of cryptography will be introduced.

Unit 1

Information Theory: Introduction, Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Markoff statistical model for information source, Entropy and information rate of mark-off source. 10 Hours

Unit 2

Source Coding: Encoding of the source output, Shannon's encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels. 10 Hours

Unit 3

Fundamental Limits on Performance: Source coding theorem, Huffman coding, Discrete memory less Channels, Mutual information, Channel Capacity. Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem. 11 Hours

Unit 4

Introduction To Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding. Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. 11 Hours

Unit 5

RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes. Convolution Codes, Time domain approach. Transform domain approach. 10 Hours

Text Books:

1. Digital and analog communication systems, K. Sam Shanmugam, John Wiley India Pvt. Ltd, 1996.

2. Digital communication, Simon Haykin, John Wiley India Pvt. Ltd, 2008.

Reference Books:

1. ITC and Cryptography, Ranjan Bose, TMH, II edition, 2007
2. Digital Communications - Glover and Grant; Pearson Ed. 2nd Ed 2008

Course Outcomes

This course covers the fundamental concepts of information theory and error control coding. At the conclusion of the course, several objectives will be achieved:

1. Students will be introduced to the basic notions of information and channel capacity.
2. Students will be introduced to convolutional and block codes, decoding techniques, and automatic repeat request (ARQ) schemes.
3. Students will be understand how error control coding techniques are applied in communication systems.
4. Master the basic ideas behind the shannon channel capacity results.
5. Students will understand the basic concepts of cryptography.
6. Be able to assess the potential of new and unique channel methods

ELECTIVE – V

Course Title :Fuzzy Logic			
Course Code: P13CS841	**Semester : VIII**	**L-T-P: 2 : 1 : 0**	**Credits : 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites
1. Elementary mathematics
2. Theory of computation

Course Learning Objectives

The students should be able to
1. **Describe** fuzzy logic fundamentals.
2. **Learn** Properties, Relations and Mapping of Classical and Fuzzy set operations**.**
3. **Illustrate** the basic mathematical elements of the theory of fuzzy sets**.**
4. **Know** the rules of fuzzy logic for fuzzy control.
5. **Describe** fuzzy set theory, Fuzzy synthetic evaluation, Fuzzy pattern recognition, Fuzzy grammar and Syntactic recognition.

Course Content

Unit 1

Classical / Crisp sets and Fuzzy sets: Classical sets: Operations on Classical Sets; Properties of Classical Sets; Mapping of classical sets to functions. Fuzzy set operations; Properties of Fuzzy Sets; Classical Relations and Fuzzy Relations: Cartesian product; Crisp Relations: Cardinality of Crisp Relations; Operations on Crisp Relations; Properties of Crisp Relations. Fuzzy Relations: Cardinality of fuzzy relations; Operations and Properties of fuzzy relations; fuzzy Cartesian product and composition; Non interactive fuzzy sets; Tolerance and Equivalence relations: Crisp equivalence and tolerance relations 12 Hours

Unit 2

Membership functions: Features of membership function; Standard forms and Boundaries; Fuzzification; Membership value assignments: Intuition; Inference; Rank Ordering; Angular Fuzzy Sets; Neural Networks; Genetic Algorithms, Inductive reasoning Fuzzy-to–Crisp Conversions: Lambda-Cuts for Fuzzy Sets; Lambda- Cuts for Fuzzy Relations. Defuzzification Methods. **Fuzzy Classification**: Classification by equivalence relations: Crisp relations; Fuzzy relations; Cluster analysis; Cluster validity; c-means clustering: Hard c-means; fuzzy c-means; Classification metric; Hardening the fuzzy c-partition. 10 Hours

Unit 3

Fuzzy arithmetic, numbers, vectors, classical logic and fuzzy logic: Introduction; Extension principle; Crisp functions; Mapping, and relations; Functions of fuzzy sets; Fuzzy transform; Fuzzy numbers; Interval analysis in arithmetic; Approximation methods of extension; DSW Algorithm; Fuzzy vectors; Classical Predicate Logic: Tautologies; Contradictions; Equivalence; Exclusive Or and Exclusive Nor ; logical proof; Fuzzy logic.
10 Hours

Unit 4

Fuzzy Rule Based Systems: Natural Language; Linguistic hedges; Rule based systems: Canonical rule forms; Decomposition of compound rules; Aggregation of Fuzzy rules.

Fuzzy Nonlinear Simulation: Fuzzy relational equations; Partitioning; Nonlinear simulation using fuzzy rule based systems; Fuzzy associative memories.
Fuzzy Decision Making: Fuzzy synthetic evaluation; Fuzzy ordering; Preference and Consensus; Multi objective decision making; Fuzzy Bayesian decision method; Decision making under fuzzy states and fuzzy actions. 10 Hours

Unit 5

Fuzzy Pattern Recognition: Feature analysis; Partitions of the feature space; Single sample identification; Multi feature pattern recognition; Image processing; Syntactic recognition: Formal grammar; Fuzzy grammar and Syntactic recognition.
Fuzzy Control Systems: Review of control system theory: System identification problem; Control system design problem; Control surface; Control system design stages; Assumptions in a fuzzy control system design. Application of control system in industries 10 Hours

Text Books:

1. **Fuzzy logic with Engineering applications,** Timothy J. Ross, McGraw-Hill/Wiley India Publications.2nd Edition. 2009.

Reference Books:

1. An introduction to Fuzzy control, D. Driankar, H. Hellendoom and M. Reinfrank Narosa Publishers India, 1996.(Reprint 2009)
2. Principles of Soft Computing, S.N.Shivanandam, S.N.Deepa, Wiley India (pvt) Ltd publications, First edition 2007.
3. Essentials of Fuzzy modeling and Control, R. R. Yaser and D. P. Filer John Wiley, 1994.

Course Outcomes

The students will be able to

1. Know how to perform mapping of fuzzy sets by a function and use the α-level sets in such instances.
2. Familiar with the extension principle, its compatibility with the α-level sets and the usefulness of the principle in performing fuzzy number arithmetic operations (Additions, multiplications, etc.).
3. Familiar to drawing a distinction between binary logic and fuzzy logic at the conceptual level and capable of representing a simple classical proposition using crisp set characteristic function and likewise representing a fuzzy proposition using fuzzy set membership function.
4. Apply fuzzy inference applications in the area of control and robotics.
5. Describe the use of fuzzy inference systems in the design of intelligent or humanistic systems and the application of fuzzy inference in the area of control system.

Course Title :Software Testing			
Course Code: P13CS842	**Semester : VIII**	**L-T-P: 2 : 1 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr	**Weightage :CIE:50% SEE:50%**		

Prerequisites

1. Software engineering

Course Learning Objectives:

1. Conceptual view of testing insights
2. Understanding the core elements of boundary values
3. Discovery of path
4. System testing guidelines, ASF (Atomic System Functions) testing example. Context of Interaction, A taxonomy of interaction
5. Fault-Based Testing
6. Validation and verification to find degree of freedom

Course Content

Unit 1

A Perspective on Testing, Examples: Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The NextDate function, The commission problem, The SATM (Simple Automatic Teller Machine) problem, The currency converter, Saturn windshield wiper. 10 hours

Unit 2

Boundary Value Testing, Equivalence Class Testing, Decision Table Based Testing: Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. 10 hours

Unit 3

Path Testing, Data Flow Testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Definition-Use testing, Slice-based testing, Guidelines and observations.

Levels of Testing, Integration Testing: Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing. A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.

12 Hours

Unit 4

System Testing, Interaction Testing: Threads, Basic concepts for requirements specification, Finding threads, Structural strategies and functional strategies for thread testing, SATM test threads, System testing guidelines, ASF (Atomic System Functions) testing example. Context of interaction, A taxonomy of interactions, Interaction, composition, and determinism, Client/ Server Testing.

Process Framework: Validation and verification, Degrees of freedom, Varieties of software. Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback. The quality process, Planning and monitoring, Quality goals, Dependability properties, Analysis, Testing, Improving the process, Organizational factors. 10 hours

Unit 5

Fault-Based Testing, Test Execution: Overview, Assumptions in faultbased testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. Test Execution: Overview, from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles, Capture and replay.

Planning and Monitoring the Process, Documenting Analysis and Test: Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, The quality team, Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports. 10 Hours

Text Books:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008.
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009.

Reference Books:

1. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.
2. Srinivasan Desikan, Gopalaswamy Ramesh: Software Testing Principles and Practices, 2nd Edition, Pearson Education, 2007.
3. Brian Marrick: The Craft of Software Testing, Pearson Education, 1995.

Course outcomes:

1. Demonstrate the view of testing aspects
2. Conceptual view of testing insights
3. Understanding the core elements and evaluation of boundary values
4. Discovery of path testing and data flow testing
5. System testing guidelines, ASF (Atomic System Functions) testing example. Context of Interaction, A taxonomy of interaction
6. Conclusion of Fault-Based Testing
7. Validation and verification to find degree of freedom

Course Title :Agile Technologies			
Course Code: P13CS843	**Semester : VIII**	**L-T-P: 2 : 1 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

1. Software engineering

Course Objectives

This course aims to:

1. To understand the basic concepts of Agile Software Process.
2. To gain knowledge in the area of various Agile Methodologies.
3. To develop Agile Software Process
4. To know the principles of Agile Testing
5. Assess product quality risks within an Agile project

Course content

Unit 1

INTRODUCTION

Software is new product development – Iterative development – Risk (Driven and Client (Driven iterative planning – Time boxed iterative development – During the Iteration, No changes from external stakeholders –Evolutionary and adaptive Development (Evolutionary requirements analysis – Early "Top Ten" high (level requirements and skilful analysis Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery – The most common mistake – Specific iterative and Evolutionary methods. 12 Hours

Unit 2

AGILE AND ITS SIGNIFICANCE

Agile development – Classification of methods – The agile manifesto and Principles – Agile project management – Embrace communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive Process – Principle(based versus Rule(Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods. The facts of change on software projects –Key motivations for iterative Development – Meeting the requirements challenge iteratively – Problems with the Waterfall. Research evidence – Early historical project evidence – Standards (Body evidence – Expert and thought leader evidence – A Business case for iterative development – The historical accident of waterfall validity. 10 Hours

Unit 3

AGILE METHODOLOGY

Method overview – Lifecycle – Work products, Roles and Practices values – Common mistakes and misunderstandings – Sample proj ects – Process mixtures – Adoption strategies – Fact versus fantasy – Strengths versus "Other" history. 10 Hours

Unit 4

SCRUM

Concepts –deliverable and methods. XP: Concepts –deliverable and methods Unified process: Concepts- deliverable-methods.EVE: Concepts- Methods-deliverable. EVO: Method

Overview, Lifecycle, Work Products, Roles and practices, Common mistakes and Misunderstandings, Sample Projects. 10 Hours

Unit 5

AGILE PRACTICING AND TESTING

Project management – Environment – Requirements – Test – The agile alliances – The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams. 10 Hours

Course Outcomes

1. Demonstrate a systematic understanding of current agile techniques and practices used in industry.
2. Apply industry standard agile techniques in develop software in a team.
3. Use group and individual retrospectives to critically evaluate and propose improvements in developing software in a professional context.
4. Apply concepts of XP and EVE in develop a software
5. Managing the changes applying different testing techniques

Text Book

1. Craig Larman "Agile and Iterative Development – A Manager's Guide" Pearson Education – 2004.
2. Elisabeth Hendrickson, "Agile Testing" Quality Tree Software Inc 2008.

References:

1. Shore,"Art of Agile Development" Shroff Publishers & Distributors, 2007

Course Title :Cyber Security			
Course Code: P13CS844	**Semester : VIII**	**L-T-P: 2 : 1 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites:
1. Basic fundamental knowledge of computers, Internet and network.
2. Information and network security

Relevance of the course:
1. Cyber security course covers the fundamental concepts underlying the construction of secure systems from hardware to software to the human-computer interface with the use of cryptography to secure interactions.
2. Students will develop a way of thinking i.e security- oriented better understanding how to think about adversaries and how to build systems that defend against them.

Course Objectives:
1. Learn about cybercrime, legal perspectives and understand different types of cyber attacks.
2. Understand security challenges presented by mobile devices and information systems access in the cybercrime world and get an overview of tools and methods used in cybercrime.
3. Learn about phishing , identity theft and get an overview of challenges faced in punishing the cybercriminals.
4. Understand the fundamental concepts in cyber forensics.
5. Get an overview of tools used for the forensics of hand-held devices and learn about data privacy and security best practices essential for organizations.

Course Content

Unit 1

INTRODUCTION TO CYBERCRIME

Introduction, Cybercrime definition and origins of the word, Cybercrime and information security, who are Cybercriminals, Classifications of cybercrimes, Cybercrime: The legal perspectives, Cybercrimes: An Indian perspective, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes.

CYBEROFFENSES: HOW CRIMINALS PLAN THEM

Introduction**,** How criminal plan the attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack vector, Cloud computing.

10 Hours

Unit 2

CYBERCRIME : MOBILE AND WIRELESS DEVICES

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

TOOLS AND METHODS USED IN CYBERCRIME

Introduction**,** Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks,

11 Hours

Unit 3

PHISHING AND IDENTITY THEFT

Introduction, Phishing, Identity Theft (ID Theft).

CYBERCRIMES AND CYBERSECURITY: THE LEGAL PERSPECTIVES

Introduction, Why do we need Cyber law: The Indian Context, The Indian IT Act, Challenges to Indian Law and cyber crime scenario in India, Digital Signature and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario 10 Hours

Unit 4

UNDERSTANDING COMPUTER FORENSICS

Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics

Investigation, Setting of a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to the Computer Forensics and Social Networking Sites: The Security/Privacy Threats, Forensics Auditing, Anti Forensics 10 Hours

Unit 5

FORENSICS OF HAND HELD DEVICES

Introduction, Understanding cell phone working characteristics, Hand-held devices and digital forensics, Toolkits for handheld device forensics, forensics of iPods and digital music devices, Techno legal challenges with evidence from handheld devices, Organizational guidelines on cell phone forensics.

CYBERSECURITY: ORGANIZATIONAL IMPLICATIONS

Cost of Cybercrimes and IPR Issues: Lesson for Organizations, Web Treats for Organizations: The Evils and Perils, Security and Privacy Implications from Cloud Computing, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy. 11 Hours

Text Book:

1. Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, 2014.

Reference Books:

1. Nina Godbole, Information Systems Security, Wiley India, New Delhi.
2. Kennetch J. Knapp, Cyber Security & Global Information Assurance Information Science Publishing.
3. William Stallings, Cryptography and Network Security, Pearson Publication.

Course Outcomes:

1. **Describe** cybercrime, legal perspectives and **Identify** different types of cyber attacks.
2. **Analyze** security challenges presented by mobile devices and information systems access in the cybercrime world and **Use** tools and methods used in cybercrime.
3. **Demonstrate** phishing , identity theft and **Illustrate** the challenges faced in punishing the cybercriminals.

4. **Summarize** the fundamental concepts in cyber forensics.
5. **Implement** tools used for the forensics of hand-held devices and **Develop** data privacy and security best practices essential for organizations.

Course Title : Ubiquitous Computing			
Course Code: P13CS845	**Semester : VIII**	**L-T-P: 2 : 1 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites

1. Internet of things
2. Embedded systems

Course Learning Objectives (CLO's)

1. Software infrastructure for ubiquitous computing that can support the integration between our physical space and virtual computing space.
2. Sensors and sensor network that can capture and disseminate context information,
3. Embedding computing into everyday objects,
4. Spontaneous interaction where appliances and services can seamlessly interact and interoperate with each other with little or no prior agreements, and
5. Social computing that apply ubiquitous computing techniques and everyday computing artifacts to improve our social lives.

Course Content

Unit -1

Ubiquitous Computing: Basics and Vision: Living in a Digital World; Modelling the Key Ubiquitous Computing Properties; Ubiquitous System Environment Interaction; Architectural Design for UbiCom Systems: Smart DEI Model; Discussion.

Applications and Requirements: Example Early UbiCom Research Projects; Everyday Applications in the Virtual, Human and Physical World; Discussion. 10 Hours

Unit 2

Smart Devices and Services: Service Architecture Models; Service Provision Life-Cycle; Virtual Machines and Operating Systems.

Smart Mobiles, Cards and Device Networks: Smart Mobile Devices, Users, Resources and Code; Operating Systems for Mobile Computers and Communicator Devices; Smart Card Devices; Device Networks. 10 Hours

Unit 3

Human–Computer Interaction: User Interfaces and Interaction for Four Widely Used Devices; Hidden UI Via Basic Smart Devices; Hidden UI Via Wearable and Implanted Devices; Human-Centered Design; User Models: Acquisition and Representation; iHCI Design.

Tagging, Sensing and Controlling: Tagging the Physical World; Sensors and Sensor Networks; Micro Actuation and Sensing: MEMS; Embedded Systems and Real-Time Systems; Control Systems (for Physical World Tasks). 11 Hours

Unit 4

Intelligent Systems (IS): Basic Concepts; IS Architectures; Semantic KB IS; Classical Logic IS; Soft Computing IS Models; IS System Operations.

Intelligent System Interaction: Interaction Multiplicity; Is Interaction Design; Some Generic Intelligent Interaction Applications. 10 Hours

Unit 5

Ubiquitous Communication: Audio Networks; Data Networks; Wireless Data Networks; Universal and Transparent Audio, Video and Alphanumeric Data Network Access; Ubiquitous Networks; Further Network Design Issues.

Management of Smart Devices: Managing Smart Devices in Virtual Environments; Managing Smart Devices in Human User-Centered Environments; Managing Smart Devices in Physical Environments. **Ubiquitous System: Challenges:** Overview of Challenges

11 Hours

Text Book:

1. Stefan Poslad: Ubiquitous Computing - Smart Devices, Environments & Interactions, Wiley Publication, 2009.

Course Outcome:

1. **Describe** the background, vision and the most important application areas of Ubiquitous Computing.
2. **Explain** the principles of Smart Devices & its Services.
3. **Explain** and use different new types of user interfaces including tangible, embedded and wearable interaction.
4. **Explain** and use principles of Intelligent System and its Interaction.
5. **Explain** Ubiquitous Communication, Management of Smart Devices and Ubiquitous Challenges.