SYLLABUS

AUTONOMOUS SYSTEM

For
M.Tech. I to IV Semester

Computer Science & Engineering

With effect from the Academic Year 2015-16

Hyderabad Karnataka Education Society's

Poojya Doddappa Appa College of Engineering, Kalaburagi

A Govt. Aided Autonomous College, Affiliated to VTU Belagavi, and Approved by AICTE, New Delhi

AUGUST 2015

Published by : **PRINCIPAL**
Poojya Doddappa Appa
College of Engineering, KALABURAGI
E-mail : principal@pdaengg.com

Printed by :
SANGAM PRINTERS
KALABURAGI - E-mail : sangamprintglb@gmail.com

I Semester - M.Tech. **COMPUTER SCIENCE & ENGINEERING**

Code No.	Subject	CONTACT HRS.				EVALUATION SCHEME			
		L	T	LW/P	SS	CIE	SEE	Total	Credits
15PCS11	Advances in Database Management Systems	4	0	0	0	50	50	100	4
15PCS12	Advanced Computer Networks	4	0	0	2	50	50	100	5
15PCS13	Advanced Operating System	4	2	0	0	50	50	100	5
15PCS14X	Elective - I	4	0	0	0	50	50	100	4
15PCS15X	Elective - II	4	0	0	0	50	50	100	4
15PCS16X	Elective - III	4	0	0	0	50	50	100	4
15PCS17	Advanced Computer Network Lab	0	0	3	0	50	50	100	2
	TOTAL	**24**	**2**	**3**	**2**	**350**	**350**	**700**	**28**

Note: L- Lecture, T - Tutorial, LW/P- Lab Work/Practical,SS-Self Study component, CIE - Continuous Internal Evaluation, SEE - Semester End Examination.

ELECTIVE - I	
CODE	**SUBJECT**
15PCS141	Digital Image Processing
15PCS142	Embeded Computing Systems
15PCS143	Infromation Stoarage Management

ELECTIVE - II	
CODE	**SUBJECT**
15PCS151	Advances in Computer Graphics
15PCS152	Applied parallel Computing
15PCS153	Internet of Things

ELECTIVE - III	
CODE	**SUBJECT**
15PCS161	Mobile Application Development
15PCS162	Compiler Design
15PCS163	Web Services

Code No.	Subject	CONTACT HRS.				EVALUATION SCHEME			
		L	T	LW/P	SS	CIE	SEE	Total	Credits
15PCS21	Cloud Computing	4	0	0	0	50	50	100	4
15PCS22	Software Engg & Quality Assurance	4	0	0	2	50	50	100	5
15PCS23	Multimedia Communication	4	2	0	0	50	50	100	5
15PCS24X	Elective - IV	4	0	0	0	50	50	100	4
15PCS25X	Elective - V	4	0	0	0	50	50	100	4
15PCS26X	Elective - VI	4	0	0	0	50	50	100	4
15PCS27	Seminar/Mini Project	0	0	3	0	50	50	100	2
	TOTAL	**24**	**2**	**3**	**2**	**350**	**350**	**700**	**28**

Note: L- Lecture, T - Tutorial, P-Practical, CIE - Continuous Internal Evaluation, SEE - Semester End Examination, SS - Self Study

ELECTIVE - IV	
CODE	**SUBJECT**
15PCS241	Managing Big - Data
15PCS242	Storage Area Netware
15PCS243	Data warehousing & Data Mining

ELECTIVE - V	
CODE	**SUBJECT**
15PCS251	Wireless Network & Mobile Computing
15PCS252	Machine Learning
15PCS253	Agile Technology

ELECTIVE - VI	
CODE	**SUBJECT**
15PCS261	Business Intelligence
15PCS262	Artificial Intelligence & Agent Technology
15PCS263	Wireless Sensor Network

III Semester - M.Tech. **COMPUTER SCIENCE & ENGINEERING**

Code No.	Subject	CONTACT HRS.				EVALUATION SCHEME			
		L	T	LW/P	SS	CIE	SEE	Total	Credits
15PCS31	Project - Phase I	-	-	-	-	50 (25*+25**)	50	100	12
15PCS32	Industrial Traning/Industrial Visit/ Mini Project	0	0	4	0	50 (25*+25**)	50	100	8
	TOTAL	**0**	**0**	**4**	**0**	**100**	**50**	**200**	**20**

Note: L- Lecture, T - Tutorial, LW/P- Lab Work/Practical,SS-Self Study components, CIE - Continuous Internal Evaluation, SEE - Semester End Examination.

EXPERT COMMITTEE: Consists of minimum of 3 and maximum of 5 faculty memebers In the relevant field.

PROJECT : Project work will be for a period of 8 months out of which 4 months will be during third semester as Project Phase -I & Project Phase- II will be Continued in IV sem. During this semester student has to carry out literature survey and finalise the objective of the project work.

CIE will be evaluated by concerned guide along with the expert committee on the basis of the literature collection(10-15 journal papers) & Seminar delivered by the candiate. *Mid-Sem Seminar. **End Sem Seminar before the Committee.

SEE will be evaluated by the external and internal (Guide) Examiners.

INDUSTRIAL TRAINING/INDUSTRIAL VISIT: Student has to visit atleast one Industry and undergo traning for stipulated period of Four months and submit a report of their exposure in respective field and present a seminar before the Expert committee for evaluation of **CIE** marks

SEE will be evaluated by the external and internal Examiners.

MINI PROJECT : CIE will be evaluated by the expert committee along with the Guide

IV Semester - M.Tech. **COMPUTER SCIENCE & ENGINEERING**

Code No.	Subject	CONTACT HRS.				EVALUATION SCHEME			
		L	T	LW/P	SS	CIE	SEE	Total	Credits
15PCS41	Project - Phase II	0	0	0	0	50+50	125* + 75**	300	24
	TOTAL	**0**	**0**	**0**	**0**	**100**	**200**	**300**	**24**

EXPERT COMMITTEE: Consists of minimum of 3 and maximum of 5 faculty memebers In the relevant field.

CIE during fourth semester student has to present two seminar (One at the mid semester another at the end of the semester) on Phase - II before the expert committe for evaulation.

SEE

* Evaluation of project thesis by internal and External Examiners.

** Candidate has to appear Viva-voce examination in the presesnce of internal and external examinar.

Proposed Syllabus for I Semester M.Tech.

ADVANCED IN DATA BASE MANAGEMENT SYSTEMS

Subject Code : 15PCS11	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Understand basic database concepts the structural and operation of the relational data model.
- Able to compare object database with relational database and learn how to use object database in an object oriented language.
- Use of active database to know about advanced databases such as spatial, temporary deductive , parallel distributed data warehousing.

MODULE - I

Review of Relational Data Model and Relational Database Constraints: Relational model concepts, Relational model constraints and relational database schemas; Update operations, transactions and dealing with constraint violations. Object and Object-Relational Databases: Overview of Object-Oriented Concepts – Objects, Encapsulation, Type and class hierarchies. 10 Hours

MODULE - II

Complex objects; Object model of ODMG, Object definition Language ODL; Object Query Language OQL; Overview of C++ language binding; Conceptual design of Object database. Overview of object relational features of SQL; Object-relational features of Oracle; Implementation and related issues for extended type systems, the nested relational model. 11 Hours

MODULE - III

Enhanced Data Models for Some Advanced Applications: Active database concepts and triggers; Temporal, Spatial, and Deductive Databases – Basic concepts, Parallel and Distributed Databases:

Architectures for parallel databases; Parallel query evaluation; Parallelizing individual operations; Parallel query optimizations. 10 Hours

MODULE - IV

Introduction to distributed databases: Distributed DBMS architectures; Storing data in a Distributed DBMS; Distributed catalog management; Distributed Query processing; Updating distributed data; Distributed transactions; Distributed Concurrency control and Recovery. Data Warehousing, Decision Support and Data Mining: Introduction to decision support; OLAP, multidimensional model; Window queries in SQL; Finding answers quickly; Implementation techniques for OLAP; Data Warehousing; Views and Decision support; View materialization; Maintaining materialized views. 11 Hours

MODULE - V

Introduction to Data Mining: Counting co-occurrences; Mining for rules; Tree-structured rules; Clustering; Similarity search over sequences; Incremental mining and data streams; Additional data mining tasks. More Recent Applications**:** Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

10 Hours

Text Books:

1. Elmasri and Navathe, *Fundamentals of Database Systems*, Pearson Education, 2007.
2. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, 3rd Edition, McGraw-Hill, 2003.

Reference Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*, 6th Edition, McGraw Hill, 2010.
2. Connolly and Begg, *Database Systems*, 4th Edition, Pearson Publications, 2005.

ADVANCED COMPUTER NETWORKS

Subject Code : 15PCS12	Credits : 05	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. + 2 Hrs. (SS)		Total Hours : 52

Course Outcome:

After studying this course the student will be able to;

- Exposure to basic concepts of building a network and familiarize with architectural concepts of layering and circuit packet switching, various error control techniques and their analysis.
- To gain the knowledge of internetworking concepts and familiarize with internet routing protocols and its principles.
- Understand transport layer issues ,study relates protocols, study congestion and resource allocation and Gain the knowledge of application layer protocols

MODULE - I

Review of Basic Concepts & Direct Link Networks: Building a Network; Requirements- Connectivity, Cost-Effective Resource Sharing, Support for Common Services; Network Architecture-Layering and Protocols, OSI Architecture, Internet Architecture; Performance-Bandwidth and Latency, Delay× Bandwidth Product, High-Speed Networks. Hardware Building Blocks-nodes, links; Encoding (NRZ, NRZI, Manchester, 4B / 5B), Framing, Error Detection - Two-Dimensional Parity, Internet checksum Algorithm, cyclic Redundancy Check; reliable Transmission- Stop-and-Wait, Sliding Window, Concurrent Logical Channels; Ethernet (802.3), Rings (802.5, FDDI) –Token Ring Media Access Control, Token Ring Maintenance, FDDI. 11 Hours

MODULE - II

Packet Switching & Internet Working: Switching and forwarding – Datagrams, Virtual Circuit Switching, Source Routing; Bridges and LAN Switches – Learning Bridges, Spanning Tree Algorithm, Broadcast and Multicast, Limitations of Bridges; cell switching (ATM) – Cells, Segmentation and Reassembly, Virtual Paths, Physical Layers for ATM. Simple internetworking(IP) - What is an Internetwork?, Service Model, Global Address, Datagram Forwarding in IP. 10 Hours

MODULE - III

Internetworking: Address Translation(ARP), Host configuration(DHCP), Error Reporting(ICMP), Virtual Networks and Tunnels, Network as a Graph, distance Vector(RIP), Link State(OSPF), Metrics, Routing for Mobile Hosts, Global Internet – Subnetting, Classless Routing(CIDR), Interdomain Routing(BGP), Routing Areas, IP Version 6(IPv6); Multiprotocol Label Switching (MPLS). 11 Hours

MODULE - IV

End–to-End Protocols & Resource Allocation: Simple demultiplexer (UDP); Reliable byte stream (TCP) – End-to-End Issues, Segment Format, Connection Establishment and Termination, Sliding Window Revisited, Triggering Transmission, Adaptive Retransmission, Record Boundaries, TCP Extensions, Alternative Design Choices Issues in resource allocation – Network Model, Taxonomy, Evaluation Criteria; Queuing discipline– FIFO, Fair Queuing. 10 Hours

MODULE - V

Congtion Control & Application: TCP Congestion Control– Additive Increase/ Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery; Congestion-Avoidance mechanisms – DECbit, Random Early Detection (RED), Source-Based Congestion Control. Traditional applications – Electronic Mail (SMTP, MIME, IMAP), World Wide Web (HTTP), Name Service (DNS), Network management (SNMP); Web services – Custom APPLICATION Protocols (WSDL, SOAP), A Generic application Protocol (REST). 10 Hours

TEXT BOOKS:

1. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.

REFERENCE BOOKS:

1. Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata McGraw Hill, 2006.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key Architectures, 2nd Edition Tata McGraw-Hill, 2004.

ADVANCED OPERATING SYSTEM

Subject Code : 15PCS13	Credits : 05	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. + 2 Hrs. (Tutorial)		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Understand the fundamentals of Operating Systems
- To gain knowledge on operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
- Learn the various resource management techniques for distributed systems & modify existing
- open source kernels in terms of functionality or features used.

MODULE - I

Operating System Overview, Process description & control: Operating System Objectives and Functions, The Evolution of Operating Systems, Major Achievements, Developments Leading to Modern Operating Systems, Microsoft Windows Overview, Traditional UNIX Systems, Modern UNIX Systems, Linux, What is Process, Process States, Process Description, Process Control, Execution of the Operating System, Security Issues, UNIX SVR4 Process Management. 10 Hours

MODULE - II

Threads, SMP and Microkernel, Virtual Memory: Processes and Threads, Symmetric Multiprocessing (SMP), Microkernels, Windows Vista Thread and SMP Management, Solaris Thread and SMP Management, Linux Process and Thread Management. Hardware and Control Structures, Operating System Software, UNIX and Solaris Memory Management, Linux Memory Management, Windows Vista Memory Management, Summary. 10 Hours

MODULE - III

Multiprocessor and Real-Time Scheduling: Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX PreclsSl) Scheduling, Windows Vista Scheduling, Process Migration, Distributed Global States, Distributed Mutual Exclusion, Distributed Deadlock.

11 Hours

MODULE - IV

Embedded Operating Systems : Embedded Systems, Characteristics of Embedded Operating Systems, eCOS, TinyOS, Computer Security Concepts, Threats, Attacks, and Assets, Intruders, Malicious Software Overview, Viruses, Worms, and Bots, Rootkits. 11 Hours

MODULE - V

Kernel Organization: Using Kernel Services, Daemons, Starting the Kernel , Control in the Machine , Modules and Device Management, Module Organization, Module Installation and Removal, Process and Resource Management, Running Process, Manager, Creating a new Task, IPC and Synchronization, The Scheduler , Memory Manager , The Virtual Address Space, The Page Fault Handler , File Management.

The windows NT/2000/XP kernel: Introduction, The NT kernel, Objects , Threads, Multiplication Synchronization, Traps, Interrupts and Exceptions, The NT executive , Object Manager, Process and Thread Manager , Virtual Memory, Manager, I/o Manager, The cache Manager , Kernel local procedure calls and IPC, The native API, subsystems.

10 Hours

Text Books:

1. William Stallings: Operating Systems: Internals and Design Principles, 6th Edition, Prentice Hall, 2013.
2. Gary Nutt: Operating Systems, 3rd Edition, Pearson, 2014.

Reference Books:

1. Silberschatz, Galvin, Gagne: Operating System Concepts, 8th Edition, Wiley, 2008
2. Andrew S. Tanenbaum, Albert S. Woodhull: Operating Systems, Design and Implementation, 3rd Edition, Prentice Hall, 2006.
3. Pradeep K Sinha: Distribute Operating Systems, Concept and Design, PHI, 2007

DIGITAL IMAGE PROCESSING

Subject Code : 15PCS141	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs.		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- To understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- To understand the image segmentation and representation techniques.
- To understand how image are analyzed to extract features of interest.

MODULE - I

Digital image fundamentals: Introduction, Examples of fields that use Digital image processing, Fundamental steps in Digital image Processing, Image sensing and acquisition, A simple image formation model, Image Sampling & Quantization, basic relationships between pixels. 10 Hours

MODULE - II

Background on MATLAB and image processing toolbox: Background on MATLAB and Image processing Toolbox, MATLAB working environment, Digital image representation, Reading, displaying and writing images, data classes, image types, converting between data classes and image types, array indexing, some important standard arrays, introduction to M-function programming. 10 Hours

Module - III

Image Enhancement: Background, Some basic gray level transformations: Image negatives, Log transformations, Power-law transformation, piecewise linear transformation, Histogram processing: Histogram equalization and matching, Local enhancement, Use of

Histogram statistics, Basics of spatial filtering: Smoothing linear filters, Order statistics filters, Sharpening Spatial filters: Use of Second and First derivative for enhancement.

Image enhancement in frequency domain: Background, Introduction to Fourier transform and the frequency domain: 1-D Fourier transform and its inverse, 2-D DFT and its inverse Filtering in frequency domain, Smoothing and sharpening frequency domain filters. 12 Hours

MODULE - IV

Image Restoration and Compression: A model of the Image degradation/Restoration Process, Noise models, Restoration in the presence of noise only spatial filtering, Estimating the degradation function, inverse filtering, Minimum mean square error (wiener) filtering, geometric transformation.

Image compression: Fundamentals, Image compression models, error free compression, lossy compression. 10 Hours

MODULE – V

Image segmentation, Representation and Description: Detection of discontinuities, edge linking and boundary detection, Thresholding, Region based segmentation.

Representation and description: Various schemes for representation, boundary descriptors, and regional descriptors**.** 10 Hours

Text Books:

1. Rafael C., Gonzalez & Richard E. Woods, *Digital Image Processing*, Pearson Education, 2007.
2. Rafael C. Gonzalez, Richard E wood, *Digital Image Processing Using MATLAB*, Pearson Education Publisher, 2007.

Reference books:

1. Anil K Jain, *Fundamentals of Digital Image Processing*, Pearson Education/Prentice-Hall of India Pvt. Ltd., 1997.
2. B.Chanda, D Dutta Majumder, *Digital 1mage Processing and Analysis*, Prentice-Hall, India, 2002.

EMBEDDED COMPUTING SYSTEMS

Subject Code : 15PCS142	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs.		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Distinguish the characteristics of embedded computer systems.
- Examine the various vulnerabilities of embedded computer systems.
- Design embedded systems.
- Get awareness of the changing landscape in embedded systems

MODULE - I

Introduction to embedded systems: Embedded systems, Processor embedded into a system, Embedded hardware units and device in a system, Embedded software in a system, Examples of embedded systems, Design process in embedded system, Formalization of system design, Design process and design examples, Classification of embedded systems, skills required for an embedded system designer. 10 Hours

MODULE - II

Devices and communication buses for devices network :IO types and example, Serial communication devices, Parallel device ports, Sophisticated interfacing features in device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock, Networked embedded systems, Serial bus communication protocols, Parallel bus device protocols-parallel communication internet using ISA, PCI, PCI-X and advanced buses, Internet enabled systems network protocols, Wireless and mobile system protocols. 11 Hours

MODULE - III

Device drivers and interrupts and service mechanism: Programming-I/O busy-wait approach without interrupt service mechanism, ISR concept, Interrupt sources, Interrupt servicing (Handling) Mechanism, Multiple interrupts, Context and the periods for context

switching, interrupt latency and deadline, Classification of processors interrupt service mechanism from Context-saving angle, Direct memory access, Device driver programming. 10 Hours

MODULE - IV

Interprocesses communication and synchronization of processes, Threads and tasks: Multiple process in an application, Multiple threads in an application, Tasks, Task states, Task and Data, Clear-cut distinction between functions. ISRS and tasks by their characteristics, concept and semaphores, Shared data, Inter-process communication, Signal function, Semaphore functions, Message Queue functions, Mailbox functions, Pipe functions, Socket functions, RPC functions. 10 Hours

MODULE - V

Real-time operating systems: OS Services, Process management, Timer functions, Event functions, Memory management, Device, file and IO subsystems management, Interrupt routines in RTOS environment and handling of interrupt source calls, Real-time operating systems, Basic design using an RTOS, RTOS task scheduling models, interrupt latency and response of the tasks as performance metrics, OS security issues**.**

Introduction to embedded software development process and tools, Host and target machines, Linking and location software.

11 Hours

Text Books:

1. **Raj Kamal**, "Embedded Systems: Architecture, Programming, and Design" 2nd edition , Tata McGraw hill-2013

   Chapters: Chapter 1.1 to 1.5, 1.8 to 1.12, Chapter 3, 4, 7, 8 and 13.1 to 13.3.

References:

1. **Marilyn Wolf** ,"Computer as Components, Principles of Embedded Computing System Design" 3rd edition ,Elsevier-2014 .

INFORMATION STORAGE MANAGEMENT

Subject Code : 15PCS143	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs.		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Recognize the role and use of technology in business systems and operations
- Identify and describe organizational structure and business processes within these
- Implement information systems in industry.
- Choose backup method and replication method.
- Provide securing of management storage infrastructure.

MODULE - I

Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data center Infrastructure, Virtualization and cloud computing. Data Center Environment: Application, Database Management System(DBMS), Host(compute), Connectivity, Storage, Disk Drive Components, Disk Drive Performance, Host Access to Data, Direct-Attached Storage, Storage Design Based On Application, Disk Native Command Queuing.

Introduction to Flash Drives, Concept in Practice: VMware ESXi. Data Protection: RAID:RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID levels, RAID Impact on Disk Performance, RAID Comparison, Hot Spares. 11 Hours

MODULE - II

Intelligent Storage Systems: Components of an Intelligent Storage System, Storage Provisioning, Types of intelligent Storage Systems, Concepts in Practice: EMC Symmetrix and VNX. Fibre Channel Storage Area Networks: Fibre Channel: Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity.

Switched Fabric Ports, Fibre Channel Architecture, fabric Services, Switched fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN, Concepts in Practice: EMC Connectrix and EMC VPLEX.IP SAN and FcoE: iSCSI, FCIP, FcoE. 11 Hours

MODULE - III

Network-Attached Storage: General-purpose Servers versus NAS Devices, benefits of NAS, File Systems and network File Sharing. Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, factors Affecting NAS Performance, File-Level Virtualization, Concepts in Practice: EMC Isilon and EMC VNX gateway. Object-Based and unified Storage: Object-Based Storage Devices, Content- Addressed Storage, CAS use Cases, unified Storage, Concepts in Practice: EMC atoms, EMC VNX, and EMC centera.

Backup and Archive : Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operation, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Dedupulication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture, Concepts in Practice: EMC Networker, EMC Avamar, and EMC Data domain. 10 Hours

MODULE - IV

Local Relication: Replication Terminology, Uses of Local Replicas, Replica Course Title: Information Storage Consistency, Local Replication Technologies, Tracking Changes to Source and Replica, Restore and Restart Considerations, Creating Multiple Replicas, Local Replication in Virtualized Environment, Concepts in Practice: EMC TimeFinder. Remote Replication: Modes of Remote Replication, Remote Replication Technologies, Three-Site Replication, Data Migration Solutions, Remote Replication and Migration in a Virtualized Environment, Concepts in Practice EMC SRDF, EMC Mirror View, and EMC RecoverPoint. 10 Hours

MODULE - V

Securing the Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments, Concepts in practice: RSA and

VMware Security Products. Managing the Storage Infrastructure: Monitoring the Storage Infrastructure, Storage Infrastructure Management Activities, Storage Infrastructure Management Challenges, Developing an Idea Solution, Information Lifecycle Management, Storage Tiering, Concepts in Practice: EMC Infrastructure. 10 Hours

Text Book:

1. G.Somasundaram,Alok Shrivastava , *Information Storage and Management* , EMC Education Servises ,Wiley Publishing, Inc 2009.

References:

1. EMC Corporation, Information Storage and Management, Wiley, India. ISBN-13: 978-8126537501, August 2012
2. Robert Spalding, “Storage Networks: The Complete Reference”, Tata McGraw Hill , Osborne, 2003.
3. Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne, 2001.
4. Additional resource material on www.emc.com/resource-library/resource-library.esp.

ADVANCES IN COMPUTER GRAPHICS

Subject Code : 15PCS151	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Represent and implement images and objects using 3D representation and openGL methodologies.
- Designs develop surface detection using various detection methods.
- Choose various illumination models for provides effective standards of objects.
- Design of develop effective computer animations.

MODULE - I

Three-Dimensional Object Representations: Polyhedra, OpenGL Polyhedron Functions, Curved Surfaces, Quadric Surfaces, Super quadrics, OpenGL Quadric-Surface and Cubic-Surface Functions, Blobby Objects, Spline Representations, Cubic-Spline Interpolation Methods, Bezier Spline Curves, Bazier Surfaces B-Spline Curves, B-Spline Surfaces, Beta- Splines, Retional Splines, Conversion Between Spline Representations, Displaying Spline Curves and surfaces, OpenGL Approximation-Spline Functions, Sweep Representations, Constructive Solid –Geometry Method, Octrees, BSP Trees, Fractal-Geometry Methods, Shape Grammars and Others Procedural Methods, Particle Systems, Physically Based Modeling, Visualization Of Data Sets. 11 Hours

MODULE - II

Visible-Surface Detection Methods: Classification Of Visible –Surface Detection Algorithms, Back-Face Method, Depth-Buffer Method, A-Buffer Method, Scan-Line Method, BSP-Tree Method, Area-Subdivision Method, Octree Methods, Ray-Casting Method, Comparison of Visibility –Detection Methods, Curved Surfaces, Wire-Frame Visibility –Detection Functions. 10 Hours

MODULE - III

Illumination Models and Surface- Rendering Methods: Light Sources, Surface Lighting Effects, Basic Illumination Models, Transparent Surfaces, Atmospheric Effects, Shadows, Camera parameters, Displaying light intensities, Halftone patterns and dithering techniques, polygon rendering methods, ray-tracing methods, Radiosity lighting model, Environment mapping, Photon mapping, Adding surface details, Modeling surface details with polygons, Texture mapping, Bump mapping, OpenGL Illumination and surface-rendering functions, openGL texture functions.

11 Hours

MODULE - IV

Color models, color applications and Computer animation: Properties of light, Color models, Standard primaries and the chromaticity diagram, The RGB color model, The YIQ and related color models, The CMY and CMYK color models, The HSV color model, The HLS color model, Color Selection and applications. Raster methods for computer animation, Design of animations sequences, Traditional animation techniques, General computer-animation functions, Computer-animation languages, Key-frame systems, Motion specification, Articulated figure animation, Periodic motions, OpenGL animation procedures. 10 Hours

MODULE - V

Hierarchical modeling and Graphics file formats: Basic modeling concepts, Modeling packages, General hierarchical modeling methods, Hierarchical modeling using openGL display list, Image-File configurations, Color-reduction methods, File-compression techniques, Composition of the major file formats. 10 Hours

Text Books:

1. Computer Graphics with openGL-Hearn Baker 4rd edition, Pearson publication.2010 (Chapter 8,9,10.12.13.14,15)
2. James D Foley,Andries van dam,Steven K Feiner,John F Hughes, Computer graphics, Pearson Education 3rd edition, 2013

Reference Books:

1. Edward Angel: Interactive Computer graphics a top-down approach with openGL, Addison Wesley, 6th edition 2012
2. Advanced graphics programming using openGL: TomMcReynolds-David Blythe. Elesvier.MK, 2005

APPLIED PARALLEL COMPUTING

Subject Code : 15PCS152	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Understand Performance and Floating Point Considerations of CUDA Memories
- Design Data Parallelism Model using OPENCL
- Develop projects on Game Design, Applications like Matrix multiplication, MRI reconstruction Molecular Visualization, etc.

MODULE - I

Introduction and History :GPUs as Parallel Computers; Architecture of a Modem GPU; Parallel Programming Languages and Models; Overarching Goals; Evolution of Graphics Pipelines; The Era of Fixed-Function; Graphics Pipelines; Evolution of Programmable Real-Time Graphics; Unified Graphics and Computing Processors; GPGPU; An Intermediate Step; GPU Computing; Scalable GPUs Recent Developments; Future Trends. 11 Hours

MODULE - II

CUDA Memories, Performance Considerations and Floating Point Considerations: Importance of Memory Access Efficiency; CUDA Device Memory Types; A Strategy for Reducing Global Memory Traffic; Memory as a Limiting Factor to Parallelism; Global Memory Bandwidth; Dynamic Partitioning of SM Resources; Data Prefetching; Instruction Mix; Thread Granularity; Measured Performance; More on thread execution, Global memory bandwidth, dynamic partitioning of SM resources, Floating point format, Arithmetic Accuracy and rounding. 11 Hours

MODULE - III

Floating Point Considerations: Floating-Point Format, Normalized Representation of M, Excess Encoding of E, Representable Numbers, Special Bit Patterns and Precision, Arithmetic Accuracy and Rounding, Algorithm Considerations. 10 Hours

Module IVIntroduction to OPENCL : Introduction to OPENCL; Background; Data Parallelism Model; Device Architecture; Kernel Functions; Device Management and Kernel Launch; Electrostatic Potential Map in OpenCL

Parallel Programming and Computational Thinking : Goals of Parallel Programming, Problem Decomposition, Algorithm Selection, Computational Thinking. 10 Hours

Module VIntroduction to Embedded GPU Computing : Architecture, Programming Model, Programs, Configuration etc.

Case Study /Projects : Concepts of Game Design, Applications like Matrix multiplication, MRI reconstruction Molecular Visualization and Gaming. 10 Hours

Text book:

1. Programming Massively Parallel Processors: A Hands on Approach; David B. Kirk, Wen-mei W. Hwu; Morgan Kaufmann /Elsevier India reprint 2010

Reference Books:

1. *Heterogeneous Computing with OpenCL, by Benedict R. Gaster, Lee Howes, David R. Kaeli, Perhaad Mistry & Dana Schaa*; Morgan Kaufmann 2011

INTERNET OF THINGS

Subject Code : 15PCS153	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcome:

After studying this course the student will be able to;

- Understand internet of Things technology and relate it ubiquitous computing.
- Learn about the IOT definitions , frameworks and application examples
- Fundamental IoT mechanisms and key technologies and Evolving IoT standards

MODULE - I

Internet Of Things Overview Definitions And Frameworks: Motivations, Examples of Applications, IPv6 Role , Areas of Development and Standardization, Scope of the Present Investigation. IoT Definitions, General Observation, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities. Internet Of Things Application Examples **:**Overview, Smart Metering Advanced Metering Infrastructure , e-Health Body Area Networks ,City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking (Following and Monitoring Mobile Objects), Over-The-Air-Passive Surveillance Ring of Stee, Control Application Examples, Myriad Other Applications. 10 Hours

MODULE - II

Fundamental Iot Mechanisms And Key Technologies: Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability , Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology ,RFID Technology, Satellite Technology. 10 Hours

MODULE - III

Evolving Iot Standards: Overview and Approaches, IETF IPv6 Routing Protocol for RPL Roll , Constrained Application Protocol (CoAP) ,

Background , Messaging Model, Request Response Model , Intermediaries and Caching, Representational State Transfer (REST), ETSI M2M , Third-Generation Partnership Project Service Requirements for Machine-Type Communications, Approach , Architectural Reference Model for MTC, CENELEC , IETF IPv6 Over Lowpower WPAN (6LoWPAN), ZigBee IP (ZIP) , IP in Smart Objects (IPSO). 10 Hours

MODULE - IV

Layer 1/2 Connectivity: Wireless Technologies For The Iot : WPAN Technologies for IoTM2M , ZigbeeIEEE 802.15.4, Radio Frequency for Consumer Electronics (RF4CE), Bluetooth and its Low-Energy Profile , IEEE 802.15.6 WBANs, IEEE 802.15 WPAN TG4j MBANs , ETSI TR 101 557 , NFC , Dedicated Short-Range Communications (DSRC) and Related Protocols, Comparison of WPAN Technologies , Cellular and Mobile Network Technologies for IoTM2M, overview and Motivations Universal Mobile Telecommunications System, LTE. 11 Hours

MODULE - V

Layer 3 Connectivity: Ipv6 Technologies For The Iot : Overview and Motivations, Address Capabilities, IPv4 Addressing and Issues,IPv6 Address Space, IPv6 Protocol Overview, IPv6 Tunneling, IPsec in IPv6, Header Compression Schemes, Quality of Service in IPv6, Migration Strategies to IPv6 , Technical Approaches, Residential Broadband Services in an IPv6 Environment Deployment Opportunities.

LAYER 3 CONNECTIVITY: MOBILE Ipv6 TECHNOLOGIES FOR THE Iot : Overview , Protocol Details, Generic Mechanisms, New IPv6 Protocol, Message Types, and Destination Option, Modifications to IPv6 Neighbor Discovery , Requirements for Various IPv6 Nodes, Correspondent Node Operation, HA Node Operation, Mobile Node Operation, Relationship to IPV4 Mobile IPv4 (MIP). 11 Hours

TEXT Books:

1. "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications" Author(s): Daniel Minoli.

References Books:

1. Designing the Internet of Things Adrian McEwen, Hakim Cassimally ISBN: 978-1-118-43062-0 November 2013, Wiley

2. Charalampos Doukas , “Building Internet of Things with the Arduino”, Create space, April 2002 http://postscapes.com/

3. “Architecting the Internet of Things” **Uckelmann**, Dieter, **Harrison**, Mark, **Michahelles**, Florian (Eds.) 2011, XXXI, springerEbooks.

MOBILE APPLICATION DEVELOPMENT

Subject Code : 15PCS161	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes:

After studying this course the student will be able to:

1. Describe Android OS architecture, Android application architecture, various tools used in Android development and handset Hardware.
2. Build user interfaces using various UI components and menus
3. Acquire knowledge about storing and retrievel data using native SQLITE database
4. understand to use the external services like Internet interfacing with Camera,Audio and Video in Android Apps

MODULE - I

Internals Primer: App Developers’ view, Overall Architecture, Hardware support, Native User-Space, Dalvik and Android’s Java, System Services, stock AOSP Packages, System Startup.

Hardware Primer: Typical System Architecture, What’s in a System-on-chip(SoC)?, Memory Layout and Mapping ,Development Setup.

10 Hours

MODULE - II

Fundamentals of Android Development: Introduction to Android: The Android 4.1 Jelly Bean SDK, Understanding the Android Software Stack, Installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text View Control, Using the Android Emulator.

Basic Widgets : Understanding the Role of Android Application Components, Event Handling , Displaying Messages Through Toast, Creating and Starting an Activity, Using the EditText Control. 10 Hours

MODULE - III

Building Blocks for Android Application Design : Laying Out Controls in Containers – Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using ImageView, Frame \ Layout, Table Layout, Grid Layout, Adapting to screen orientation.

Utilizing Resources and Media – Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Image Switcher Application, Scrolling, Playing Audio and Video, Displaying Progress with ProgressBar, Using Assets.

11 Hours

MODULE - IV

Building Menus and Storing Data : Creating Interactive Menus and ActionBars – Menus and their types, Creating Menus through XML, Creating Menus through coding, Applying a context menu to a ListView, using ActionBar, Replacing a Menu with the ActionBar, Creating Tabbed ActionBar, Creating a DropDown List ActionBar.

Using Databases – Using the SQLiteOpenHelper Class, Accessing Databases with the ADB, Creating a Data Entry Form. 10 Hours

MODULE - V

Displaying web pages and maps: Displaying web pages, Using WebViewClient Class, Using Google Maps.

Communicating with SMS and emails: Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working with the Telephony Manager.

Publishing android applications : Setting Versioning Information of an Application, Generating a Certificate, Digitally Signing the Android Applications and Generating APK, Distributing Applications with Google Play. 11 Hours.

Text Book:

1. Mobile Communications, Jochen Schiller, Third Edition, Pearson Education - 2011

Reference Books:

1. Android programming, B.M.Hirwani, Pearson publications-2013.

COMPILER DESIGN

Subject Code : 15PCS162	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes:

After completion of this course, the students would be able to

- Understand the concepts Lexical and Syntax Analysers.
- Design Various Parser like LR, LALR, etc.
- Develop an algorithm table Symbol table generation, data types and Data checking.
- Understand the concepts of generating the code for Data Structures, control statements and expressions.

MODULE - I

Introduction: Need for compilers, Programs Related to compilers, Translation process, and Major Data structure in compiler, Bootstrapping and porting Lexical analysis :Scanning process, Regular Expressions, Finite Automata, From regular expressions to DFA, Specifications of Tokens, Recognition of Tokens. 11 Hours

MODULE II

Syntax Analysis: Parsing process, context free grammars, parse tree, ambiguity Top-down Parsing: Recursive descent parsing, LL(1) parsing.

Bottom-up Parsing: Overview of Bottom-up Parsing, Simple LR Parser(SLR(1). 10 Hours

MODULE - III

More powerful parsers: LR(1),LALR(1) parsing. 11 Hours

MODULE - IV

Semantic Analysis : Attributes and Attributes grammars, Algorithm for attribute computation, Symbol table, data types and Data checking. 10 Hours

MODULE - V

Code Generation : Intermediate Code and data structure for code generation, Code generation of data structure references, code generation of control statements and expressions. 10 Hours

Text Book:

1. Kenneth C Louden: Compiler Construction Principles & Practice, Cengage Learning, 1997
2. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman: Compilers - Principles, Techniques and Tools, 2nd Edition, Pearson, 2007.

References:

1. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 1997
2. Charles N. Fischer, Richard J. leBlanc, Jr.: Crafting a Compiler with C, Pearson, 1991.
3. Peter Linz: An Introduction to formal languages and Automata, IV edn, Narosa,2009

WEB SERVICES

Subject Code : 15PCS163	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Construct the technical articles of selected domain.
- Scrutinize the technical articles of a chosen topic
- Explore the technical articles of chosen topic.
- Design the model for essential theme in research.
- Inscribe the Summary of articles in a scientific style.

MODULE - I

Middleware: Understanding the middle ware, RPC and Related Middle ware, TP Monitors, Object Brokers, Message-Oriented Middleware.

10 Hours

MODULE - II

Web Services: Web Services Technologies, Web Services Architecture.

10 Hours

MODULE - III

Basic Web Services Technology: WSDL Web Services Description Language, UDDI Universal Description Discovery and Integration, Web Services at work interactions between the Specifications, Related Standards. 11 Hours

MODULE - IV

Service Coordination Protocols: Infrastructure for Coordination Protocols, WS- Coordination, WS-Transaction, Rosetta Net and Other Standards Related to Coordination Protocols. 10 Hours

MODULE - V

Service Composition: Basic of Service Composition, A New Chance of Success for Composition, Services Composition Models, Dependencies

between Coordination and Composition, BPEL: Business Process Execution Language for Web Services, Outlook, Applicability of the Web Services, Web services as a Problem and a Solution : AN Example.

11 Hours

Text Books:

1. Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju: Web Services (Concepts, Architectures and Applications), Springer International Edition 2009.

ADVANCED COMPUTER NETWORKS LABORATORY

Subject Code : 15PCS17	Credits : 02	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Practical)		

LIST OF EXPERIMENTS:

PART - A

Implement the following using C/C++ or equivalent with LINUX/ Windows environment:

1. Write a program to transfer the contents of a requested file from server to the client using TCP/IP Sockets (using TCP/IP Socket programming).
2. Write a program to achieve Traffic management at Flow level by implementing Closed Loop Control technique. (using Leaky Bucket Algorithm)
3. Write a program for frame sorting technique used in buffers.
4. Write a program for implementing the error detection technique while data transfer in unreliable network using CRC-CCITT (16-bits) Technique.
5. Write a program for Hamming Code generation for error detection and correction.

PART - B

Simulation Programs using Qualnet 7.1 / NS2 or any other equivalent software.

Note: (i) Analyze the network behavior by collecting the statistics on network performance and draw the conclusion.

(ii) Standard Network Parameters and supporting protocols may be assumed for simulation.

1. Create a scenario for homogeneous WLAN (IBSS / BSS network) using Bellman ford routing protocol and analyze the network behavior for the following cases.

   a. Network hub and without mobility

   b. Network hub and with mobility.

   c. Using 0.5 sq km terrain.

2. Design architecture for Universal Mobile Telecommunications System (UMTS) and analyze the network behavior.

3. Create a scenario for homogeneous WLAN (BSS Network/ Infrastructure mode) using 0.5 sq.km terrain using AODV routing protocol and analyze the network behavior.

4. Create a scenario for homogeneous WLAN (Mobile Ad hoc Network) using 2 sq.km terrain and analyze the network behavior.

a. Without mobility

b. With mobility

5. Create a scenario for homogeneous/ heterogeneous Mobile Ad hoc Network onto a terrain file using AODV routing protocol and apply the geographical parameters such as Cartesian latitude and longitude and analyze the network behavior.

6. Create a scenario for Heterogeneous Network analysis behavior and analyze the network behavior.

   a. Using Bellman ford routing protocol without mobility.

b. Using Bellman ford routing protocol with mobility.

c. Using AODV routing protocol and apply weather (rain fall) properties to it.

Note: For S.E.E, programs similar to above list may be asked for the examination.

CLOUD COMPUTING

Subject Code : 15PCS21	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Understand the key dimensions of the challenges of Cloud Computing and describe the benefits of cloud computing
- Understand the challenges of cloud computing and its infrastructure.
- Analyse/ manage cloud resource using scheduling algorithms its security.

MODULE - I

Introduction: Cloud Computing Overview, Applications, Internets and the cloud, First movers in the cloud, Your organization and cloud Computing,: When you can Use Cloud Computing, Benefits, Network-centric computing and network centric content, peer-peer systems, Cloud computing an old idea whose time has come , Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Major challenges faced by cloud computing.

Cloud Infrastructure :Cloud computing at Amazon, Cloud computing the Google perspective Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, User experience and software licensing. Exercises and problems. 11 Hours

MODULE - II

Cloud Computing: Application Paradigms: Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper.

The Map Reduce programming model, A case study: The GrepTheWeb application , Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research. 10 Hours

MODULE - III

Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security, Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based, paravirtualization, Optimization of network virtualization, vBlades,

10 Hours

MODULE - IV

Cloud Resource Management and Scheduling : Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling Combinatorial auctions for cloud resources. 10 Hours

MODULE - V

Scheduling algorithms for computing clouds: Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Resource management and dynamic scaling, Exercises and problems.

Cloud Security: Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization.

11 Hours

Text Books:

1. Antony T Velte, Cloud Computing : A Practical Approach, McGrawHill.

2. Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.

References:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014

2. John W Rittinghouse, James F Ransome:Cloud Computing Implementation, Management and Security, CRC Press 2013.

SOFTWARE ENGINEERING AND QUALITY ASSURANCE

Subject Code : 15PCS22	Credits : 05	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (LW/P)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Select and implementation of different software development process models. Extract and analyze software requirements specifications for real time problems.
- Develop some basic level of software architecture/design and Defining the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
- Apply different testing and debugging techniques and analyzing their effectiveness and also Acquire the Knowledge of software risks and risk management strategies

MODULE - I

Software Processes and Project Management & S/W requirement: Software Process Models, Process Iteration, Process Activities, The Rational Unified Process, Computer Aided Software Engineering. Project Management : Management Activities, Project Planning, Project Scheduling, Risk Management.

Requirements Engineering : Software Requirements : Functional and Non-functional requirements, User Requirements, System Requirements, Interface specification, The software requirement Document. Requirements Engineering Processes : Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. 10 Hours

MODULE - II

Design Engineering & requirement Engg process : Architectural Design – Architectural Design Decisions, System Organization, Modular

decomposition styles, Control Styles. Object-oriented design : Object and Object classes, An Object-oriented design process, Design Evolution. Real-Time Software design : System design, Real-time operating systems, Monitoring and control systems, Data acquisition systems. 10 Hours

MODULE - III

Software Development and Management : Rapid Software Development- Agile methods, Extreme Programming, Rapid Application Development, Software Prototyping. Computer Based software engineering : Components and Component models, The CBSE process, Component composition. Managing People : Selecting Staff, Motivating People, Managing groups, The people Capability Maturity Model. Software cost estimation : Software productivity, Estimation techniques, Algorithmic Cost modeling, Project duration and staffing. 10 Hours

MODULE - IV

Testing Strategies : A strategic approach to Software Testing, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, System Testing, The art of Debugging.

Testing Techniques : Software testing fundamentals, Test case Design, White Box testing, Basis Path testing, Control Structure Testing, Black Box Testing, Testing for Specialized Environments, Architectures, and Applications. 11 Hours

MODULE - V

Product Metrics: Software Quality, A framework for Product Metrics, Metrics for Analysis Model, Metrics for the Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal approaches to SQA, Statistical Software Quality Assurance, Software Reliability, The ISO 9000 Quality Standards, The SQA Plan. 11 Hours

TEXT BOOK

1. Software Engineering, Sommerville, Eighth Edition, Pearson Education, 2009
2. Software Engineering: A Practitioner's Approach, Roger S Pressman, Tata McGraw-Hill Sixth edition, 2005.

REFERENCES

1. Richard Fairley, *"Software Engineering Concepts"* –, Tata Mcgraw Hill, 2008.
2. Ian Sommerville, *"Software Engineering"*, Seventh Edition, Pearson Education Asia, 2007.
3. Gopalaswamy Ramesh, Ramesh Bhattiprolu, *"Software Maintenance"* Tata Mcgraw Hill,2003.
4. Shari Lawarence Pfleeger, Joanne M.Atlee *"Software Engineering Theory and Practice"* , Third Edition, Pearson Education, 2006.
5. Alistair Cockburn, *"Agile Software Development"*, First Edition, Pearson Education Asia, 2001.
6. Hans Van Vliet *"Software Engineering: Principles and Practices"* , Wiley; 3 edition, 2008.

MULTIMEDIA COMMUNICATION

Subject Code : 15PCS23	Credits : 05	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (Tutorial)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Have an excellent understanding of multimedia data and enabling technologies services and applications.
- Understand audio and video compression techniques
- Learn multimedia information networks and their QoS parameters
- Analyse and study various multimedia transport and management protocols

MODULE - I

Multimedia Communications: Introduction, multimedia information representation, multimedia networks, multimedia applications, media types, communication modes, network types, multipoint conferencing, network QoS, application QoS**.**

Multimedia Information Representation: Introduction, digital principles, text, images, audio, video. 11 Hours

MODULE - II

Text and image compression: introduction, compression principles, text compression, image compression. 10 Hours

MODULE - III

Audio and video compression: introduction, audio compression, DPCM, ADPCM, APC, LPC, video compression, video compression principles, H.261, H.263, MPEG, MPEG-1, MPEG-2, MPEG-4 and MPEG 7.

10 Hours

MODULE - IV

Standards for multimedia communications: Introduction, Reference models, Standards relating to interpersonal communications, Standards

relating to interactive applications over the internet, Standards for entertainment applications. 10 Hours

MODULE - V

Multimedia Information Networks-1: Introduction, network performance parameters, throughput, networking delay, delay variance, error rate, quality of service.QoS perspectives, QoS processing, multimedia transmission, requirements, transmission over WANs, Multimedia Transmission over LANs. ATM networks, Wireless LANs.

Multimedia Transport Protocols and Management Protocols: RTP, RTCP, H.323, SIP, SDP, SAP. 11 Hours

Text Books:

1. Fred Halsall, *Multimedia Communications*: *Applications, Networks, Protocols and Standards,* Pearson Education, Asia,Second Indian reprint 2002.
2. Nalin K. Sharda: *Multimedia Information Networking*, PHI, 2003.
3. James F.Kurose, keith W. Ross, *Computer Networking- A top Down Approach Featuring the internet,* Pearson Education, 3rd Ed.

Reference Books:

1. Ralf Steinmetz, Klara Narstedt: *Multimedia Fundamentals,* Vol 1-Media Coding and Content Processing, Pearson Education, 2004.
2. Prabhat K. Andleigh, Kiran Thakrar, *Multimedia Systems Design,* PHI, 2004.

MANAGING BIG - DATA

Subject Code : 15PCS241	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

OUTCOMES:

Upon Completion of the course, the students will be able to.

- Describe big data and use cases from selected business domains
- Explain NoSQL big data management.
- Install, configure, and run Hadoop and HDFS
- Perform map-reduce analytics using Hadoop and able to use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

MODULE - I

UNDERSTANDING BIG DATA : Types of digital data –classification of data ,introduction to big data –characteristics of big data , evolution of big data,definition of big data ,challenges with big data what is big data – why big data, traditional business intelligence (BI) versus big data,what is new today.big data analytics – where do we begin? ,what is big data analytics, what is big data analytics isn't ,classification of big data analytics ,greatest challenges that prevent business from capitalization on big data, top challenges facing big data why big data analytics important, data sciences, data scientist, terminologies, used in big data.

10 Hours

MODULE - II

NOSQL DATABASE : Introduction to NoSQL types of NoSQL Databases,why NoSQL,advantages of NoSQL and its use of NoSQL in industry SQL verus NoSQL ,nes SQL ,comparision of SQL ,NoSQL,newSQL. Introduction to MongoDB,why and what MongoDB ,RDBMS and MongoDB,data types in MongoDB,MongoDB query language. 10 Hours

MODULE - III

BASICS OF HADOOP : Data format – analyzing data with Hadoop –

scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization Avro – file-based data structures. 10 Hours

MODULE - IV

MAPREDUCE APPLICATIONS : MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats. 10 Hours

MODULE - V

HADOOP RELATED TOOLS : Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

Case studies: Hadoop and Hive at Facebook :Hadoop at face book , hypothetical use case studies, Hive, problems and future work.

12 Hours

TEXT BOOKS:

1. Seema Acharaya and Subhashini Chellappan “Big Data and analytics”,Wiley2015
2. Tom White, “Hadoop: The Definitive Guide”, Third Edition, O’Reilley, 2012.

REFERENCE BOOKS:

1. P. J. Sadalage and M. Fowler, “NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence”, Addison-Wesley Professional, 2012.
2. Eric Sammer, “Hadoop Operations”, O’Reilley, 2012.
3. E. Capriolo, D. Wampler, and J. Rutherglen, “Programming Hive”, O’Reilley, 2012.

4. Lars George, “HBase: The Definitive Guide”, O’Reilley, 2011.

5. Eben Hewitt, “Cassandra: The Definitive Guide”, O’Reilley, 2010.

6. Alan Gates, “Programming Pig”, O’Reilley, 2011.

7. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Businesses”, Wiley, 2013.

STORAGE AREA NETWORK

Subject Code : 15PCS242	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Identify the need for performance evaluation and the metrics used for it
- Apply the techniques used for data maintenance.
- Realize storage virtualization concept,
- Develop techniques for evaluating policies for LUN masking, file systems.

MODULE - I

Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access.

Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems. 11 Hours

MODULE - II

I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage.

Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system.

File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS. 10 Hours

MODULE - III

Storage Virtualization: Definition of Storage virtualization ; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.

10 Hours

MODULE - IV

SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective.

Software Components of SAN: The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs. 11 Hours

MODULE - V

Management of Storage Network: System Management, Requirement of management System, Support by Management System, Management Interface, Standardized Mechanisms, Property Mechanisms, In-band Management, Use of SNMP, CIM and WBEM, Storage Management Initiative Specification (SMI-S), CMIP and DMI, Optional Aspects of the Management of Storage Networks, Summary.

10 Hours

Text Book:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2013.

Reference Books:

1. Robert Spalding: “Storage Networks The Complete Reference”, Tata McGraw-Hill, 2011.
2. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.
3. Richard Barker and Paul Massiglia: “Storage Area Network Essentials A CompleteGuide to understanding and Implementing SANs”, Wiley India, 2006.

DATA WAREHOUSING AND DATA MINING

Subject Code : 15PCS243	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory) + 2 Hrs. (SS)		Total Hours : 52

Course Outcomes

At the end of the course student will be able to

- Store voluminous data for online processing and preprocess the data for mining applications
- Apply the association rules for mining the data
- Design and deploy appropriate classification techniques
- Cluster the high dimensional data for better organization of the data

MODULE - I

Introduction and Data Preprocessing : Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted, Major issues in data mining.

Data Preprocessing: An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.

10 Hours

MODULE - II

Data warehousing and online analytical processing: Data warehousing: Basic concepts, Data warehouse, modeling: Data cube and OLAP, Data warehouse design and usage, Data warehouse implementation, Data generalization by attribute-oriented induction.

11 Hours

MODULE - III

Classification: Basic Concepts: Basic Concepts, Decision tree induction, Bays Classification Methods, Rule- Based classification, Model evaluation and selection, Techniques to improve classification accuracy.

11 Hours

MODULE - IV

Association Analysis – 1: Problem Definition; Frequent Item set generation; Rule Generation; Compact representation of frequent item sets; Alternative methods for generating frequent item sets.

Association Analysis – 2: FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns. 10 Hours

MODULE - V

Cluster Analysis: Basic concepts and methods: Cluster Analysis, Partitioning methods, Hierarchical Methods, Density-based methods, Grid-Based Methods, Evaluation of clustering.

Data mining trends and research frontiers: Mining complex data types, other methodologies of data mining, Data mining applications. 10 Hours

TEXT BOOK:

1. Jiawei Han, Micheline Kamber, Jian Pei: Data Mining Concepts and Techniques, ELSEVIER(MK) 3rd edition 2012.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar **,** *Introduction to Data Mining***,** Pearson Education, 2007

Reference Books:

1. K.P.Soman, Shyam Diwakar, V.Ajay, *Insight into Data Mining – Theory and Practice* , PHI publishers, 2006.

WIRELESS NETWORK & MOBILE COMPUTING

Subject Code : 15PCS251	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Work on state of art techniques in wireless communication.
- Explore CDMA, GSM, Mobile IP, WiMax
- Work on Different Mobile OS
- Develop program for CLDC, MIDP let model and security concerns

MODULE - I

Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing.

Wireless Networks : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS, Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Introduction to WiMAX. 11 Hours

MODULE - II

Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6. 11 Hours

MODULE - III

Mobile OS and Computing Environment: Smart Client Architecture,

The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux and Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators. 10 Hours

MODULE - IV

Building, Mobile Internet Applications: Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.

10 Hours

MODULE - V

J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet lifecycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.

10 Hours

TEXT BOOKS:

1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and ServiceCreation, 2nd Edition, Tata McGraw Hill, 2010.
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003.

REFERENCE BOOKS:

1. Raj kamal: Mobile Computing, Oxford University Press, 2007.
2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

MACHINE LEARNING

Subject Code : 15PCS252	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Choose the learning techniques with this basic knowledge.
- Apply effectively neural networks and genetic algorithms for appropriate applications.
- Apply bayesian techniques and derive effectively learning rules.
- Choose and differentiate reinforcement and analytical learning techniques

MODULE - I

Introduction, Concept Learning And Decision Trees : Learning Problems – Designing Learning systems, Perspectives and Issues – Concept Learning – Version Spaces and Candidate Elimination Algorithm – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search. 10 Hours

MODULE - II

Neural Networks And Genetic Algorithms: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning. 10 Hours

MODULE - III

Bayesian And Computational Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probably Learning – Sample Complexity for Finite and Infinite Hypothesis Spaces – Mistake Bound Model. 11 Hours

MODULE - IV

Instant Based Learning And Learning Set Of Rules: K- Nearest Neighbor Learning – Locally Weighted Regression – Radial Basis Functions – Case-Based Reasoning – Sequential Covering Algorithms – Learning Rule Sets – Learning First Order Rules – Learning Sets of First Order Rules – Induction as Inverted Deduction – Inverting Resolution.

11 Hours

MODULE - V

Analytical Learning And Reinforced Learning: Perfect Domain Theories – Explanation Based Learning – Inductive-Analytical Approaches - FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning. 10 Hours

TEXT BOOK:

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013.

REFERENCES:

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.
2. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1st edition, 2001.

AGILE TECHNOLOGY

Subject Code : 15PCS253	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Understand The XP Lifecycle, XP Concepts, Adopting XP
- Work on Pair Programming, Root-Cause Analysis, Retrospectives, Planning, Incremental Requirements, Customer Tests Implement Concepts to Eliminate Waste

MODULE - I

Need for Agile : Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility.

Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor. 10 Hours

MODULE - II

Understanding XP: The XP Lifecycle, The XP Team, XP Concepts, **Adopting XP:** Is XP Right for Us? Go!, Assess Your Agility. 10 Hours

MODULE - III

Practicing XP: Thinking: Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives.

Collaborating: Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

Releasing:"Done Done", No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

Planning: Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating. Developing Incremental requirements, Customer Tests, Test-Driven Development,

Refactoring, Simple Design, Incremental Design and Architecture, Spike Solutions, Performance Optimization, Exploratory Testing. 11 Hours

MODULE - IV

Mastering Agility Values and Principles: Commonalities, About Values, Principles, and Practices, Further Reading

Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules.

Rely on People: Build Effective Relationships, Let the Right People Do the Right Things, Build the Process for the People.

Eliminate Waste: Work in Small, Reversible Steps, Fail Fast, Maximize Work Not Done, Pursue Throughput. 11 Hours

MODULE - V

Deliver Value: Exploit Your Agility, Only Releasable Code Has Value, Deliver Business Results, Deliver Frequently

Seek Technical Excellence : Software Doesn't Exist, Design Is for Understanding, Design Tradeoffs, Quality with a Name, Great Design, Universal Design Principles, Principles in Practice, Pursue Mastery 10 Hours

Text Books:

1. **The Art of Agile Development** (Pragmatic guide to agile software development), James shore, Chromatic, O'Reilly Media, Shroff Publishers & Distributors, 2007

Reference Books:

1. Agile Software Development, Principles, Patterns, and Practices, Robert C. Martin, Prentice Hall; 1st edition, 2002
2. "Agile and Iterative Development A Manger's Guide", Craig Larman Pearson Education, First Edition, India, 2004.

BUSINESS INTELLIGENCE

Subject Code : 15PCS261	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course,

- Know the complete life cycle of BI/Analytical development
- Understand the technology and processes associated with Business Intelligence framework
- Given a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal.

MODULE - I

Development Steps, BI Definitions, BI Decision Support Initiatives, Development Approaches, Parallel Development Tracks, BI Project Team Structure, Business Justification, Business Divers, Business Analysis Issues, Cost – Benefit Analysis, Risk Assessment, Business Case Assessment Activities, Roles Involved In These Activities, Risks Of Not Performing Step, Hardware, Middleware, DBMS Platform, Non Technical Infrastructure Evaluation. 11 Hours

MODULE - II

Managing The BI Project, Defining And Planning The BI Project, Project Planning Activities, Roles And Risks Involved In These Activities, General Business Requirement, Project Specific Requirements, Interviewing Process. 11 Hours

MODULE - III

Differences in Database Design Philosophies, Logical Database Design, Physical Database Design, Activities, Roles and Risks Involved In These Activities, Incremental Rollout, Security Management, Database Backup and Recovery. 10 Hours

MODULE - IV

Growth Management, Application Release Concept, Post Implementation

Reviews, Release Evaluation Activities, The Information Asset and Data Valuation, Actionable Knowledge – ROI, BI Applications, The Intelligence Dashboard. 10 Hours

MODULE - V

Business View of Information technology Applications: Business Enterprise excellence, Key purpose of using IT, Type of digital data, basics f enterprise reporting, BI road ahead. 10 Hours

Text Books:

1. Larissa T Moss and ShakuAtre – Business Intelligence Roadmap : The Complete Project Lifecycle for Decision Support Applications, Addison Wesley Information Technology Series, 2003.
2. R N Prasad, Seema Acharya – Fundamentals of Business Analytics, Wiley India, 2011.

Reference Books:

1. David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher: Morgan Kaufmann, ISBN 1- 55860-196-4.
2. Brian Larson - Delivering Business Intelligence with Microsoft SQL Server 2005, McGraw Hill, 2006.
3. Lynn Langit - Foundations of SQL Server 2008 Business Intelligence –Apress, ISBN13: 978-1-4302-3324-4, 2011

ARTIFICAL INTELLIGENCE AND AGENT TECHNOLOGY

Subject Code : 15PCS262	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Design intelligent agents for problem solving, reasoning, planning, decision making, and learning. specific design and
- performance constraints, and when needed, design variants of existing algorithms.
- Apply AI technique on current applications.
- Problem solving, knowledge representation, reasoning, and learning.

MODULE - I

What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique? The Level of the model, Criteria for success, some general references, One final word and beyond.

Problems, problem spaces, and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs, Additional Problems.

Intelligent Agents: Agents and Environments, The nature of environments, The structure of agents. 10 Hours

MODULE - II

Heuristic search techniques: Generate-and-test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Mean-ends analysis.

Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem.

Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates, Resolution, Natural Deduction.

Logical Agents: Knowledge –based agents, the Wumpus world, Logic-Propositional logic, Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. 11 Hours

MODULE - III

Symbolic Reasoning Under Uncertainty: Introduction to nonmonotonic reasoning, Logic for nonmonotonic reasoning, Implementation Issues, Augmenting a problem-solver, Implementation: Depth-first search, Implementation: Breadth-first search.

Statistical Reasoning: Probability and bayes Theorem, Certainty factors and rule-based systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy logic.

Quantifying Uncertainty: Acting under uncertainty, Basic probability notation, Inference using full joint distributions, Independence, Bayes' rule and its use, The Wumpus world revisited. 11 Hours

MODULE - IV

Weak Slot-and-filter structures: Semantic Nets, Frames.

Strong slot-&-filler structures: Conceptual dependency, scripts, CYC.

Adversarial Search: Games, Optimal Decision in Games, Alpha-Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games, Partially Observable Games, State-Of-The-Art Game Programs, Alternative Approaches, Summary. 10 Hours

MODULE - V

Learning From examples: Forms of learning, Supervised learning, Learning decision trees, Evaluating and choosing the best hypothesis, The theory of learning ,PAC, Regression and Classification with linear models, Nonparametric models, Support vector machines, Ensemble learning.

Learning Probabilistic Models: Statistical learning, learning with complete data, learning with hidden variables: The EM algorithm.

10 Hours

Text Books

1. Elaine Rich,Kevin Knight, Shivashanka B Nair:Artificial Intelligence, Tata CGraw Hill 3rd edition. 2013

2. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2013.

Reference Books:

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101.

WIRELESS SENSOR NETWORK

Subject Code : 15PCS263	Credits : 04	
CIE : 50 Marks	SEE : 50 Marks	SEE : 03 Hrs.
Hours/Week : 4 Hrs. (Theory)		Total Hours : 52

Course Outcomes

After completion of this course, the students would be able to

- Understand challenges, advantages and applications future directions of sensor networks.
- Emphasis on network sensors, routing protocols and infrastructure establishments and database challenges.
- Understanding tasking and control techniques for sensor networks and acquires the Knowledge of various platforms and tools.

MODULE - I

Introduction: Unique Constraints and Challenges, Advantages of Sensor Networks, Energy advantage, Detection advantage, Sensor Network Applications, Habitat monitoring, Wildlife conservation through autonomous, non-intrusive sensing, Tracking chemical plumes, Ad hoc, just-in-time deployment mitigating disasters, Smart transportation: networked sensors making roads safer and less congested, Collaborative Processing.

Localization and Tracking : Key Definitions of Sensor Networks, Canonical Problem: Localization and Tracking, Tracking Scenario, Problem

Formulation, Sensing model, Collaborative localization, Bayesian state estimation, Distributed Representation and Inference of States, Impact of choice of representation, Design desiderata in distributed tracking, Tracking Multiple Objects, State space decomposition, Data association, Sensor Models, Performance Comparison and Metrics. 12 Hours

MODULE - II

Networking Sensors: Networking Sensors, Key Assumptions, Medium Access Control, The SMAC Protocol, IEEE 802.15.4 Standard and ZigBee, General Issues, Geographic, Energy-Aware Routing, Unicast Geographic Routing, Routing on a Curve, Energy-Minimizing Broadcast, Energy-Aware Routing to a Region, Attribute-Based Routing, Directed Diffusion, Rumor Routing, Geographic Hash Tables.

Infrastructures Establishment: Infrastructure Establishment, Topology Control, Clustering, Time Synchronization, Clocks and Communication Delays, Interval Methods, Broadcasts, Localization and Localization Services, Ranging Techniques, Range-Based Localization Algorithms, Other Localization Algorithms, Location Services.

10 Hours

MODULE - III

Sensor Tasking and Control :Task-Driven Sensing, Roles of Sensor Nodes and Utilities, Information- Based Sensor Tasking, Sensor selection, IDSQ: Information-driven sensor querying, Cluster leader based protocol, Sensor tasking in tracking relations, Joint Routing and Information Aggregation, Moving center of aggregation, Multi-step information-directed routing, Sensor group management, Case study: Sensing global phenomena.

Databases: Sensor Network Databases, Sensor Database Challenges, Querying The Physical Environment, Query Interfaces, Cougar sensor database and abstract data types, Probabilistic queries, High-level Database Organization, In- Network Aggregation, Query propagation and aggregation, Tiny DB query processing, Query processing scheduling and optimization. 10 Hours

MODULE - IV

Data-Centric Storage, Data Indices and Range Queries, One-dimensional

indices, Multidimensional indices for orthogonal range searching, Non-orthogonal range searching, Distributed Hierarchical Aggregation, Multi-resolution, Partitioning, Fractional cascading, Locality preserving hashing, Temporal Data, Data aging, Indexing motion data.

Platforms and Tools: Sensor Network Platforms and Tools, Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms. 10 Hours

MODULE - V

Operating system: Tiny OS, Imperative language: nesC, Dataflow style language: Tiny GALS, Node-Level Simulators, ns-2 and its sensor network extensions, TOSSIM, Programming Beyond Individual Nodes: State-centric programming, Collaboration groups, PIECES: A state-centric design framework, Multi-target tracking problem revisited. Applications and Future Directions.

Application and Future Directions: Emerging application, Future Research Directions: Secure Embedded systems, Programming Model and Embedded operating systems, Management of collaborative groups, Lightweigth Signal processing, Networks of high data rate sensors, Google for physical world, closing the loop with actuators, Distributed Information architecture. 10 Hours

Text Book:

1. Feng Zhao, Leonidas Guibas, *Wireless Sensor Networks – An Information Processing Approach,* Elsevier, 2004

Reference Book:

1. Ananthram Swami et. el, *Wireless Sensor Networks, Signal Processing and Communication Perspectives*, John Wiley, 2007.