## SOFTWARE ENGINEERING

**Subject Code- BCSES1-601** **L T P C** **Duration – 45Hrs.**
**3 0 0 3**

**COURSE OBJECTIVE:**
To enable the students to learn the principles and methodologies followed to develop good software.

**COURSE OUTCOMES:**
1. To study how software engineering principles evolve and to analyze the various software models that can be followed to develop software.
2. To understand the software analysis and design step of software development.
3. To study coding, testing and reliability of a software.
4. To highlight the various management activities and related terms of a software.

**COURSE CONTENTS:**

**UNIT-I (10 Hrs)**

**Introduction**: Evolution and impact of Software engineering, Software crisis, Principles of Software Engineering, Feasibility study

**Software Life Cycle Models**: Waterfall, prototyping, Evolutionary, and Spiral models, Comparison of software models.

**UNIT-II (11 Hrs)**

**Scheduling and Planning**: Management Activities, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts.

**Requirement Analysis**: Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

**UNIT-III (14 Hrs)**

**Software Design**: Basic principles of software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, Design specifications, Design metrics, Verification and validation, User Interface design.

**Coding**: Coding standards and Code review techniques, Coding styles, Coding metrics.

**Software Testing**: Fundamentals of testing, Types of software testing, White-box, and black-box testing, test case design techniques, mutation testing and Testing metrics.

**UNIT-IV (10 Hrs)**

**Reliability**: Software reliability metrics, reliability growth modelling.

**Software Quality Management**: Risk Management, Quality management, ISO and SEI CMMI, Six Sigma, Computer aided software engineering, Software maintenance, Software Configuration Management, Component-based software developments

**RECOMMENDED BOOKS:**

1. Pressman, 'Software Engineering: A Practitioner's Approach', 3rd Edn., TMH, **2004**
2. Flecher and Hunt, 'Software Engineering and CASE: Bridging and Culture Gap', **2000**.
3. Shepperd, 'Software Engineering, Metrics', Vol.-1 (EN), McMillan, **1999.**
4. Robert S. Arnold, 'Software Re–engineering', IEEE Computer Society, **1994**.
5. Pankaj Jalote, 'An Integrated Approach to Software Engineering', 3rd Edn., Narosa Publishers, **2006**.
6. Ghezzi, Cario, 'Fundamentals of Software Engineering', 2nd Edn., PHI, **2002**.

## COMPUTER NETWORKS

**Subject Code- BCSES1-602** **L T P C** **Duration – 60Hrs.**
**3 1 0 4**

**COURSE OBJECTIVE:**

1. To develop an understanding of modern network architectures from a design andperformance perspective.
2. To provide an opportunity to do network programming
3. To provide a WLAN measurement ideas.

**COURSE OUTCOMES:**

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given problem related TCP/IP protocol developed the network programming.
4. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

**COURSE CONTENTS:**

**UNIT I (15 Hrs)**

**Data communication Components:** Representation of data and its flow Networks, VariousConnection Topology, Protocols and Standards, OSI model, Transmission Media, LAN:Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques forBandwidth utilization: Multiplexing - Frequency division, Time division and Wavedivision, Concepts on spread spectrum.

**UNIT II (15 Hrs)**

**Data Link Layer and Medium Access Sub Layer:** Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error controlprotocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window,Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA

**UNIT III (15 Hrs)**

**Network Layer:** Switching, Logical addressing – IPV4, IPV6; Address mapping –ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

**Transport Layer:** Process to Process Communication, User Datagram Protocol(UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

**UNIT IV (15 Hrs)**

**Application Layer:** Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts ofCryptography

**RECOMMENDED BOOKS**

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson PrenticeHall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4.Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.

5. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

## COMPUTER NETWORKS LABORATORY

**Subject Code- BCSES1-603** **L T P C**
**0 0 2 1**

**COURSE OBJECTIVE:**
This practical course will enable students to implement networking in real world.

**COURSE OUTCOMES:**
1. To become familiarize with different networking components.
2. To learn the concept of data transmission using different cables.
3. To learn different topologies and implement file sharing.
4. To implement different networks.

**PRACTICALS**
1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. To Prepare straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows and Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client



## MOBILE APPLICATION DEVELPOMENT

**Subject Code- BCSED1-611** **L T P C** **Duration – 45Hrs.**
**3 0 0 3**

**COURSE OBJECTIVE:**
This course will help to manage mobile application data by integrating them with cloud services. This course also helps to understand different testing methodologies for mobile application.

**COURSE OUTCOMES:**
1. To learn application models of mobile application frameworks.
2. To learn Mobile OS architectures.
3. To be database access in different mobile OS.
4. To learn testing methodologies for mobile applications.

**COURSE CONTENTS:**

**UNIT I (11Hrs)**

**Introduction to mobile devices:** Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and intel architectures, Power management, screen resolution,Touch interfaces, Application deployment, App Store, Google play, Windows Store.

**UNIT II (11 Hrs)**

**Mobile OS Architectures:** Comparing and contrasting architectures of all three- Android, iOS and Windows, Underlying OS, Kernel structure and native level programming. Approaches to power management, Security.

**UNIT III (12 Hrs)**

**Android/iOS/Win8 Apps:** DB Access, network access, contacts/ photos/ etc. Underneath the frameworks: Native level programming on Android, Low Level programming on iOS, Windows low level APIs

**Intents and services:** Android intents and services, characteristics of mobile applications, Successful mobile development.

**UNIT IV (11 Hrs)**

**Storing and Retrieving data:**Synchronizationand replication of mobile data,Androidstoring and retrieving data, working with content provider, Putting it all together: packaging and deploying, Performance best practices, Android field service app.

**RECOMMENDED BOOKS:**

1. Bill Philips, Chris Stewart, Brian Hardy, “Android Programming”.
2. Brian Fling, “Mobile Design and Development”.
3. Valentino Lee, Heather Schneidar, “Mobile applications: Architecture, Design, Development”.



## MACHINE LEARNING

**Subject Code- BCSED1-612** **L T P C** **Duration – 45Hrs.**
**3 0 0 3**

**COURSE OBJECTIVE:**

**1.** To learn applications of machine learning.
**2.** To learn different learning algorithms.

**COURSE OUTCOMES:**

1. To learn the concept of learning algorithm.
2. To learn representation of decision trees.
3. To learn unsupervised learning.
4. To learn about SVMs.

**COURSE CONTENTS:**

**UNIT-I (12 Hrs)**

**Introduction:**Introduction to machine learning, use of machine learning, type of machine learning: supervised, unsupervised and reinforcement learning, Main challenges in machine learning

**Preparation of Model:** Introduction to Statistical Learning, Significance of Mean, Mode, Median, variance, standard deviation, Basic types of data in machine learning, Exploring structure of data, Data quality and remediation, Data pre-processing.

**Modelling and evaluation:** Model Selection, Training, Model representation and interpretability, evaluating performance of a model.

**UNIT-II (08 Hrs)**

**Supervised Learning** (Regression/Classification):
**Basic methods**: Distance-based methods, Decision Trees, random forest model, Naive Bayes
**Linear models**: Simple Linear Regression, Multiple linear regression, Polynomial regression, Logistic Regression.

**UNIT-III (15 Hrs)**

**Unsupervised Learning** (Clustering): Different types of clustering techniques, K-medoids, K-means/Kernel K-means, Hierarchical clustering

**Dimensionality Reduction**: Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Introduction to Matrix Factorization and Matrix Completion

**UNIT-IV (10 Hrs)**

**Support Vector Machines**(SVM): Linear learning machines and Kernel space, Making Kernels and working in feature space, SVM for classification and regression problems. Recent trends in machine learning.

**RECOMMENDED BOOKS:**

1. Saikat Dutt , Subramanian Chandramouli and Amit Kumar Das, 'Machine Learning', Pearson, 2019.
2. Oliver Theobald, 'Machine Learning For Absolute Beginners: A Plain English Introduction (Second Edition).



## DISTRIBUTED SYSTEMS

**Subject Code- BCSED1-613** **L T P C** **3 0 0 3** **Duration – 45Hrs.**

**COURSE OBJECTIVE:**
This course will help to understand the concepts of Distributed Systems.

**COURSE OUTCOMES**:

1. To learn architecture of DDBS.
2. To learn different design strategies and query processing.
3. To Optimize Distributed queries.
4. To learn reliability issues.

**COURSE CONTENTS:**

**UNIT-I (12 Hrs)**

**Introduction:** Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database, Distributed Database Management System Architecture: Transparencies in a distributed DBMS; Distributed DBMS architecture;

**UNIT-II (11 Hrs)**

**Distributed Database**: Design Alternative design strategies; Distributed design issues; Fragmentation; Data allocation. QUERY PROCESSING ISSUES, Objectives of query processing, Layers of query processing, Query decomposition

**UNIT-III (11 Hrs)**

**Distributed Query Optimization**: Factors governing query optimization; Centralized query optimization; Transaction Management The transaction concept; Goals of transaction

management; Characteristics of transactions, Concurrency control in centralized database systems and DDBSs.

**UNIT-IV (11 Hrs)**

**Reliability:** Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols. Parallel Database Systems: Parallel architectures; parallel query processing.

**Recommended Books:**

1. M.T. Ozsu and P. Valduriez, 'Principles of Distributed Database Systems', Prentice Hall, 1991.
2. D. Bell and J. Grimson, 'Distributed Database Systems', Addison Wesley, 1992.

## SIGNALS AND SYSTEMS

**Subject Code- BCSED1-614** **L T P C** **Duration – 45Hrs**
**3 0 0 3**

**COURSE OBJECTIVE:**

1. To introduce the students about the theoretical concepts associated with processing continuous & discrete time signals & systems.
2. To make the students aware about the signal transmission through linear networks.
3. To be able to think critically & to apply problem solving & reasoning strategies to the analysis of various types of signals & systems.
4. To impart them knowledge of various types of noises.

**COURSE OUTCOMES**:

1. Analyze the properties of signals & systems and representation in time and frequency domain.
2. Classify systems based on their properties and determine the response of LSI system.
3. Apply random signal theory and understand various types of noise.
4. Understand the process of sampling and reconstruction.

**COURSE CONTENTS:**

**UNIT-I (12 Hrs)**

**Classification of Signals and Systems:** Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals, System properties: linearity, additivity and homogeneity, shiftinvariance, causality, stability, realizability. **FourierRepresentation:** The notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality, Convolution theorem and its graphical interpretation.

**UNIT-II (11 Hrs)**

**Linear Shift-invariant (LSI) Systems:** Impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems, System representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system.

**Introduction to Noise:** Thermal Noise, Shot noise, Partition noise, Flicker noise, Gaussian Noise. Equivalent input noise, Signal to Noise Ratio (SNR), Noise Temperature, Noise equivalent Bandwidth, Noise Figure.

**UNIT-III (11 Hrs)**

**Random Signal Theory:** Introduction to Probability Theory, Joint and Conditional Probability, Random Events, Probability Mass Function, Statistical Averages. Probability Density Functions (PDF) and Statistical Averages, mean, moments and expectations, standard deviation and variance, Probabilitymodels: Uniform, Gaussian, Binomial, Examples of PDF, Transformation of Random Variables, Random Processes, Stationary and Ergodicity, Auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density.

**UNIT-IV (11 Hrs)**

**Sampling and Reconstruction:** Sampling Theorem and its implications- Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, Aliasing and its effects, Relation between continuous and discrete time systems. Concept of State-space analysis: State-space analysis and multi-input, multi-output representation, the state-transition matrix and its role.

**RECOMMENDED BOOKS**:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. A. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.
5. Douglas K. Lindner, "Introduction to Signals and Systems", Mc-Graw Hill International Edition: c1999.
6. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.
7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons (SEA) Private Limited, c1995.
8. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", Tata Mc Graw Hill Edition, 2003.
9. I. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2001.
10. Ashok Ambardar, "Analog and Digital Signal Processing", Second Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), c1999.

## DATA MINING

**Subject Code- BCSED1-621** **L T P C** **Duration – 45Hrs**
**3 0 0 3**

**COURSE OBJECTIVE:**

1. To cover powerful data mining techniques including clustering, association rules, and classification.
2. Web mining is also introduced.

**COURSE OUTCOMES:**

1. To introduce the basic concepts of Data Mining techniques.
2. To have knowledge of decision trees and algorithms used for it.
3. To learn the concept of search engines.
4. To understand web mining.

**COURSE CONTENTS:**

**UNIT-I (12 Hrs)**

**Data Mining:** Introduction to data mining, introduction to data warehousing, architecture of data warehouse, association rules in mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation (FP, growth), performance evaluation of algorithms.

**UNIT-II (11 Hrs)**

**Classification:** Introduction, decision tree, tree induction algorithms – split algorithm based on information theory, split algorithm based on Gini index; naïve Bayes method; estimating predictive accuracy of classification method

**UNIT-III (11 Hrs)**

**Cluster Analysis:** Introduction, partitional methods, hierarchical methods, density based methods, dealing with large databases, cluster software; Search engines: Characteristics of Search engines, Search Engine Functionality, Search Engine Architecture, Ranking of web pages, The search engine history, Enterprise Search, Enterprise Search Engine Software.

**UNIT IV(11 Hrs)**

**Web Data Mining:** Web Terminology and Characteristics, Locality and Hierarchy in the web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web mining Software.

**RECOMMENDED BOOKS:**

1. Carlo Vercellis, 'Business Intelligence: Data Mining and Optimization for Decision Making', 1st Edn., WILEY, **2009**.
2. J. Han, M. Kamber and J. Pei, 'Data Mining Concepts and Techniques', 3rd Edn., Morgan Kaufmann Publishers, **2011**.
3. V. Pudi, P.R. Krishana, 'Data Mining', 1st Edn., Oxford University Press, **2009**.
4. P. Adriaans, D. Zantinge, 'Data Mining', 1st Edn., Pearson Education Press, **1996**.
5. P. Pooniah, 'Data Warehousing Fundamentals', 1st Edn., Willey Interscience Publication, **2001**.

## CLOUD COMPUTING

**Subject Code- BCSED1-622** **L T P C** **Duration – 45Hrs**
**3 0 0 3**

**COURSE OBJECTIVE:**

1. To understand what is cloud storage, characteristics of cloud computing,
2. To know about cloud computing services and cloud hosting, cloud data storage and deployment models.
3. To learn cloud computing companies and cloud service providers, cloud infrastructure.
4. To learn advantages of cloud computing and issues with cloud computing.

**COURSE OUTCOMES:**

1. To learn basic terms used in cloud computing and its benefits.
2. To learn architecture of Hadoop.
3. To implement cloud security.
4. To manage services provided by cloud.

**COURSE CONTENTS:**

**UNIT-I (12 Hrs)**

**Cloud Computing Fundamentals:** Introduction to Cloud Computing, private, public and hybrid cloud. Cloud types: IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, Role of virtualization in enabling the cloud; Benefits and challenges to Cloud architecture.

**UNIT-II (12 Hrs)**

Hadoop - Apache Hadoop Architecture, Hadoop YARN, Comparison of Traditional system & Hadoop Ecosystem, Installation steps of Hadoop (1.x), Moving Data in and out of Hadoop, need for Record Reader and Record writer, understanding inputs and outputs file format of Map Reduce.

**UNIT-III (10 Hrs)**

Cloud Security and Trust Management, Open Source Clouds -Baadal, Open Stack, Cloud Stack

**UNIT-IV (11 Hrs)**

**Cloud Applications, Cloud Services Management:** Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment, computing infrastructures available for implementing cloud based services.

**RECOMMENDED BOOKS:**

1. Chris Eaton, Dirk deroos et al., 'Understanding Big data', 1st Edn., McGraw Hill, **2015**.
2. Tom White, 'HADOOP: The definitive Guide', 4th Edn., O Reilly, **2015**.
3. Gautam Shroff, 'Enterprise Cloud Computing Technology Architecture Applications', 1st Edn., Cambridge University Press, **2010**.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, 'Cloud Computing, A Practical Approach', 1st Edn., McGraw Hill Education, **2009**.
5. Thomas Erl, ' Big Data Fundamentals', 1st Edn., Pearson Education, **2016**
6. Srinivasan, ' Cloud Computing', 1st Edn,, Pearson Education, **2016.**

## PARALLEL PROCESSING

**Subject Code- BCSED1-623** **L T P C** **Duration – 45Hrs**
**3 0 0 3**

**COURSE OBJECTIVE:**
Students will have skills in RISC as well as CISC architectures and can design or analyses different problems associated with this domain.

**COURSE OUTCOMES:**
1. Design and analyze the parallel algorithms for real world problems and implement them on available parallel computer systems.
2. To implement basic communication operations.
3. To implement various threads.
4. To learn different sorting algorithms.

**COURSE CONTENTS:**

**Unit-I (12 Hrs)**

**Introduction:** Implicit parallelism, Limitations of memory system performance, control structure, communication model, physical organization, and communication costs of parallel platforms, Routing mechanisms for interconnection networks, Mapping techniques.
**Parallel algorithm design:** Preliminaries, decomposition techniques, tasks and interactions, mapping techniques for load balancing, methods for reducing interaction overheads, parallel algorithm models.

**UNIT- II (11 Hrs)**

**Basic communication operations:** Meaning of all-to-all, all-reduce, scatter, gather, circular shift and splitting routing messages in parts.
**Analytical modeling of parallel programs:** sources of overhead, performance metrics, the effect of granularity on performance, scalability of parallel systems, minimum execution time, minimum cost-optimal execution time, asymptotic analysis of parallel programs.

**UNIT III (11 Hrs)**

**Programming using message passing paradigm:** Principles, building blocks, MPI, Topologies and embedding, Overlapping communication and computation, collective communication operations, Groups and communicators
**Programming shared address space platforms:** Threads, POSIX threads, Synchronization primitives, attributes of threads, mutex and condition variables, Composite synchronization constructs, OpenMP Threading Building blocks; An Overview of Memory Allocators, An overview of Intel Threading building blocks.

**UNIT IV (11 Hrs)**

**Dense Matrix Algorithms:** matrix vector multiplication, matrix-matrix multiplication, solving system of linear equations.
**Sorting:** Sorting networks, Bubble sort, Quick sort, Bucket sort and other sorting algorithms Graph algorithms: Minimum spanning tree, single source shortest paths, all-pairs shortest paths, Transitive closure, connected components, algorithms for sparse graphs.

**RecommendedBooks**

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar : Introduction to Parallel Computing, Second Edition Pearson Education – 2007
2. Michael J. Quinn (2004), Parallel Programming in C with MPI and OpenMP McGraw-Hill International Editions, Computer Science Series

## EMBEDDED SYSTEMS

**Subject Code- BCSED1-624** **L T P C** **Duration – 45Hrs**
**3 0 0 3**

**COURSE OBJECTIVE:**
This course helps to understand the basic concepts of embedded systems.

**COURSE OUTCOMES:**
1. To learn specifications and analysis of embedded systems.
2. To estimate hardware and software costs.
3. To learn arm programming instruction set.
4. To learn IDE.

**COURSE CONTENTS:**

**Unit-I (11 Hrs)**

**Introduction:** Specifications and analysis of embedded systems, interface to the real time operating systems, verification of embedded systems like formal verification, co simulation

**Unit-II (11 Hrs)**

Estimation of hardware and software costs, partitioning, synthesis (hardware, software,memory, bus), retargetable usage of the software, specification and verificationof the OS schedules, hard and soft realtime operating systems, and faulttolerant systems.

**Unit-III (11 Hrs)**

Arm Programming Instructions Instruction Set: Data processing instructions, Addressing modes, Load Store Instructions, PSR (Program Status Register) Instructions, Conditional Instructions, Interrupt Instructions

**Unit-IV (12 Hrs)**

C Programming Integrated Development Environment (IDE) for C/C++ Programming, C/C++ Programs using Function Calls, Pointers, Structures, Integers &Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution & Loops

**Recommended Books:**

1. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, ―ARM System Developer's Guide Designing and Optimizing System Software‖, Elsevier 2008.
2. Brooks, Cole, ―Embedded Microcontroller Systems, Real Time Interfacing‖, Thomson Learning 1999
3. Steve Furber, ―ARM system on Chip Architecture‖, Addision Wesley
4. Trevor Martin, ―The Insider's Guide to The Philips ARM7 - Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series‖ Hitex Ltd.