SOFTWARE ARCHITECTURES

Subject Code: 10IS81	**I.A. Marks : 25**
Hours/Week : 04	**Exam Hours: 03**
Total Hours : 52	**Exam Marks: 100**

PART – A

UNIT – 1   **6 Hours**
Introduction: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

UNIT – 2   **7 Hours**
Architectural Styles and Case Studies: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.

UNIT – 3   **6 Hours**
Quality: Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.

UNIT – 4   **7 Hours**
Architectural Patterns – 1: Introduction; From mud to structure: Layers, Pipes and Filters, Blackboard.

<div align="center">**PART – B**</div>

UNIT – 5   **7 Hours**
Architectural Patterns – 2: Distributed Systems: Broker; Interactive
Systems: MVC, Presentation-Abstraction-Control.

UNIT – 6   **6 Hours**
Architectural Patterns – 3: Adaptable Systems: Microkernel; Reflection.

UNIT – 7   **6 Hours**
Some Design Patterns: Structural decomposition: Whole – Part;
Organization of work: Master – Slave; Access Control: Proxy.

UNIT – 8   **7 Hours**
Designing and Documenting Software Architecture: Architecture in the
life cycle; Designing the architecture; Forming the team structure; Creating a
skeletal system. Uses of architectural documentation; Views; Choosing the
relevant views; Documenting a view; Documentation across views.

Text Books:
1. Len Bass, Paul Clements, Rick Kazman: Software Architecture in
   Practice, 2nd Edition, Pearson Education, 2003.
   (Chapters 1, 2, 4, 5, 7, 9)
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter
   Sommerlad, Michael Stal: Pattern-Oriented Software Architecture,
   A System of Patterns, Volume 1, John Wiley and Sons, 2007.
   (Chapters 2, 3.1 to 3.4)
3. Mary Shaw and David Garlan: Software Architecture- Perspectives
   on an Emerging Discipline, PHI, 2007.
   (Chapters 1.1, 2, 3)

Reference Books:
1. E. Gamma, R. Helm, R. Johnson, J. Vlissides: Design Patterns-
   Elements of Reusable Object-Oriented Software, Pearson Education,
   1995.

Web Reference: http://www.hillside.net/patterns/

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SYSTEM MODELING AND SIMULATION

Sub Code: 10CS82	**IA Marks**	**: 25**
Hrs/Week: 04	**Exam Hours**	**: 03**
Total Hrs: 52	**Exam Marks**	**: 100**

PART – A

UNIT – 1   **8 Hours**

Introduction: When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. The basics of Spreadsheet simulation, Simulation example: Simulation of queuing systems in a spreadsheet.

UNIT – 2   **6 Hours**

General Principles, Simulation Software: Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing. Simulation in Java; Simulation in GPSS

UNIT – 3   **6 Hours**

Statistical Models in Simulation: Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions.

UNIT – 4   **6 Hours**

Queuing Models: Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues; Rough-cut modeling: An illustration..

PART – B

UNIT – 5   **8 Hours**

Random-Number Generation, Random-Variate Generation: Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.

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UNIT – 6   6 Hours

Input Modeling : Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models.

UNIT – 7   6 Hours

Estimation of Absolute Performance: Types of simulations with respect to output analysis; Stochastic nature of output data; Absolute measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.

UNIT – 8   6 Hours

Verification, Calibration, and Validation; Optimization: Model building, verification and validation; Verification of simulation models; Calibration and validation of models, Optimization via Simulation

Text Books:
1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 5th Edition, Pearson Education, 2010.
   (Listed topics only from Chapters1 to 12)

Reference Books:
1. Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson Education, 2006.
2. Averill M. Law: Simulation Modeling and Analysis, 4th Edition, Tata McGraw-Hill, 2007.

WIRELESS NETWORKS AND MOBILE COMPUTING

Sub Code: 10CS831	**IA Marks**	**: 25**
Hrs/Week: 04	**Exam Hours**	**: 03**
Total Hrs: 52	**Exam Marks**	**: 100**

PART-A
UNIT – 1

                       6 Hours

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

UNIT – 2   **7 Hours**
Wireless Networks – 1: GSM and SMS: 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

UNIT – 3   **6 Hours**
Wireless Networks – 2: GPRS : GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS

UNIT – 4   **7 Hours**
Wireless Networks – 3: CDMA, 3G and WiMAX: Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Introduction to WiMAX.

PART - B

UNIT – 5   **6 Hours**
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

UNIT – 6   **7 Hours**
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, Proprietary OS Client Development : The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.

UNIT – 7   **6 Hours**
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.

UNIT – 8   **7 Hours**
J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet

event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.

Text Books:

1. Dr. Ashok Talukder, Ms Roopa Yavagal, Mr. Hasan Ahmed:
   Mobile Computing, Technology, Applications and Service Creation,
   2d Edition, Tata McGraw Hill, 2010
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley, 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.

WEB 2.0 AND RICH INTERNET APPLICATIONS

Sub Code: 10CS832	**IA Marks**	**: 25**
Hrs/ Week: 04	**Exam Hours**	**: 03**
Total Hours: 52	**Exam Marks**	**: 100**

PART - A

UNIT – 1   **6 Hours**
Introduction, Ajax – 1: Web 2.0 and Rich Internet Applications, Overview of Ajax, Examples of usage of Ajax: Updating web page text, Chatting in real time, Dragging and dropping, Downloading images, Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Data download, Displaying the fetched data, Connecting to the server, Adding Server-side programming, Sending data to the server using GET and POST, Using Ajax together with XML.

UNIT – 2   **7 Hours**
Ajax – 2: Handling multiple XMLHttpRequest objects in the same page, Using two XMLHttpRequest objects, Using an array of XMLHttpRequest objects, Using inner functions, Downloading JavaScript, connecting to Google Suggest, Creating google.php, Downloading from other domains with Ajax, HTML header request and Ajax, Defeating caching, Examples.Building XML and working with XML in JavaScript, Getting the document element, Accessing any XML element, Handling whitespace in Firefox, Handling cross-browser whitespace, Accessing XML data directly, Validating XML, Further examples of Rich Internet Applications with Ajax.

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UNIT – 3   **6 Hours**

Ajax – 3: Drawing user's attention to downloaded text, Styling text, colors and background using CSS, Setting element location in the web pages, Setting the stacking order of web page elements, Further examples of using Ajax. Displaying all the data in an HTML form, Working with PHP server variables, Getting the data in to array format, Wrapping applications in to a single PHP page, Validating input from the user, Validating integers and text, DOM, Appending new elements to a web page using the DOM and Ajax, Replacing elements using the DOM, Handling timeouts in Ajax, Downloading images with Ajax, Example programs.

UNIT – 4   **7 Hours**

Flex – 1 : Introduction: Understanding Flex Application Technologies, Using Flex Elements, Working with Data Services (Loading Data at Runtime), The Differences between Traditional and Flex Web Applications, Understanding How Flex Applications Work, Understanding Flex and Flash Authoring. Building Applications with the Flex Framework: Using Flex Tool Sets, Creating Projects, Building Applications, Deploying Applications Framework Fundamentals: Understanding How Flex Applications Are Structured, Loading and Initializing Flex Applications, Understanding the Component Life Cycles, Loading One Flex Application into Another Flex Application, Differentiating Between Flash Player and the Flex Framework, Caching the Framework, Understanding Application Domains, Localization, Managing Layout: Flex Layout Overview, Making Fluid Interfaces, Putting It All Together.

PART B

UNIT – 5   **7 Hours**

Flex – 2: MXML: Understanding MXML Syntax and Structure, Making MXML Interactive Working with UI Components: Understanding UI Components, Buttons, Value Selectors, Text Components, List-Based Controls, Pop-Up Controls, Navigators, Control Bars Customizing Application Appearance: Using Styles, Skinning components, Customizing the preloader, Themes, Runtime CSS

UNIT – 6   **6 Hours**

Flex – 3: ActionScript: Using ActionScript, MXML and ActionScript Correlations, Understanding ActionScript Syntax, Variables and Properties, Inheritance, Interfaces, Handling Events, Error Handling, Using XML

UNIT – 7   **7 Hours**

Flex – 4: Managing State: Creating States, Applying States, Defining States, Adding and Removing Components, Setting Properties, Setting Styles,

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Setting Event Handlers, Using Action Scripts to Define States, Managing Object Creation Policies, Handling State Events, Understanding State Life Cycles, When To Use States.Using Effects and Transitions: Using Effects, Creating Custom Effects, Using Transitions, Creating Custom Transitions.

UNIT – 8   **6 Hours**
Flex – 5: Working with Data: Using Data Models, Data Binding, Enabling Data Binding for Custom Classes, Data Binding Examples, Building data binding proxies.Validating and Formatting Data: Validating user input, Formatting Data.

Text Books:
1. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw Hill, 2009.
   (Listed topics from Chapters 3, 4, 6, 7, 11, 12)
2. Chafic Kazon and Joey Lott: Programming Flex 3, O'Reilly, June 2009.
   (Listed topics from Chapters 1 to 8, 12 to 15)

Reference Books:
1. Jack Herrington and Emily Kim: Getting Started with Flex 3, O'Reilly, 1st Edition, 2008.
2. Michele E. Davis and John A. Phillips: Flex 3 - A Beginner's Guide, Tata McGraw-Hill, 2008.
3. Colin Moock: Essential Actionscript 3.0, O'Reilly Publications, 2007.
4. Nicholas C Zakas et al : Professional Ajax, 2nd Edition, Wrox/Wiley India, 2008.

VLSI DESIGN AND ALGORITHMS

Sub Code: 10CS833	**IA Marks : 25**
Hrs/Week: 04	**Exam Hours : 03**
Total Hrs: 52	**Exam Marks : 100**

PART - A
UNIT 1   **6 Hours**
Digital Systems and VLSI: Why design Integrated Circuits? Integrated Circuits manufacturing, CMOS Technology, Integrated Circuit Design Techniques, IP-based Design.

UNIT 2   **8 Hours**

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Fabrication and Devices: Fabrication Processes, Transistors, Wires and vias, SCMOS Design Rules, Layout design and tools.

UNIT 3   **6 Hours**
Logic Gates – 1: Combinatorial logic functions, Static Complementary gates, Switch Logic.

UNIT 4   **6 Hours**
Logic Gates – 2: Alternative gate Circuits, Low Power gates, Delay through resistive interconnect; Delay through inductive interconnect, Design for yield, Gates as IP.

PART - B

UNIT 5   **6 Hours**
Combinational Logic Networks: Standard cell-based layout, Combinatorial network delay, Logic and interconnect design, Power Optimization, Switch logic networks, Combinational logic testing.

UNIT 6   **6 Hours**
Sequential Machines: Latches and Flip-flops, Sequential systems and clocking disciplines, Clock generators, Sequential systems design, Power optimization, Design validation, Sequential testing.

UNIT 7   **6 Hours**
Architecture Design: Register Transfer design, High Level Synthesis, Architecture for Low Power, Architecture testing.

UNIT 8   **8 Hours**
Design Problems and Algorithms : Placement and Partitioning: Circuit Representation,   Wire-length Estimation, Types of Placement Problems, Placement Algorithms, Constructive Placement, Iterative Improvement, Partitioning, The Kernighan-Lin Partitioning Algorithm. Floor Planning: Concepts, Shape functions and floor plan sizing.Routing: Types of Local Routing Problems, Area Routing, Channel Routing, Introduction to Global Routing, Algorithms for Global Routing

Text Books:
1. Wayne Wolf: Modern VLSI Design - IP-Based Design, 4th Edition, PHI Learning, 2009.
   (Listed topics only from Chapters 1 to 5, and 8)
2. Sabih H. Gerez: Algorithms for VLSI Design Automation, Wiley India, 2007.
   (Listed topics only from Chapters 7, 8, and 9)

NETWORK MANAGEMENT SYSTEMS

Sub Code: 10CS834   **IA Marks**   : 25
Hrs/Week: 04   **Exam Hours** : 03
Total Hrs: 52   **Exam Marks** : 100

PART – A

UNIT 1   7 Hours

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

UNIT 2   6 Hours

Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.

UNIT 3   6 Hours

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

UNIT 4   7 Hours

SNMPv1 Network Management – 2: The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base.The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model

UNIT 5   **6 Hours**
SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMONI1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications; ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON.

UNIT 6   **6 Hours**
Broadband Network Management: ATM Networks: Broadband Networks and Services, ATM Technology – Virtual Path-Virtual Circuit, TM Packet Size, Integrated Service, SONET, ATM LAN Emulation, Virtual LAN; ATM Network Management – The ATM Network Reference Model, The Integrated Local Management Interface, The ATM Management Information Base, The Role of SNMP and ILMI in ATM Management, M1 Interface: Management of ATM Network Element, M2 Interface: Management of Private Networks, M3 Interface: Customer Network Management of Public Networks, M4 Interface: Public Network Management, Management of LAN Emulation, ATM Digital Exchange Interface Management.

UNIT 7   **6 Hours**
Broadband Network Management: Broadband Access Networks and Technologies – Broadband Access Networks, roadband Access Technology; HFCT Technology – The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management, SNMP-Based ADSL Line MIB, MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles.

UNIT 8   **8Hours**
Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Fault Location and Isolation Techniques, Performance Management – Performance Metrics, Data Monitoring, Problem

Isolation, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, Model-Based Reasoning, Case-Based Reasoning, Codebook correlation Model, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Messages Transfer Security, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy-Based Management, Service Level Management.

Text Books:
1. Mani Subramanian: Network Management- Principles and Practice, 2nd Edition, Pearson Education, 2010.

Reference Books:
1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI, 2008.

INFORMATION AND NETWORK SECURITY

Subject Code: 10CS835	**I.A. Marks : 25**
Hours/Week : 04	**Exam Hours: 03**
Total Hours : 52	**Exam Marks: 100**

PART – A

UNIT 1   **6 Hours**
Planning for Security: Introduction; Information Security Policy, Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan

UNIT 2   **6 Hours**
Security Technology-1: Introduction; Physical design; Firewalls; Protecting Remote Connections

UNIT 3   **6 Hours**
Security Technology – 2: Introduction; Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools

UNIT 4   **8 Hours**
Cryptography: Introduction; A short History of Cryptography; Principles of Cryptography; Cryptography Tools; Attacks on Cryptosystems.

PART - B

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UNIT 5   **8 Hours**
Introduction to Network Security, Authentication Applications: Attacks, services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs Kerberos, X.509 Directory Authentication Service.

UNIT 6   **6 Hours**
Electronic Mail Security: Pretty Good Privacy (PGP); S/MIME

UNIT 7   **6 Hours**
IP Security: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

UNIT 8   **6 Hours**
Web Security: Web security requirements; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET)

Text Books:
1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005. (Chapters 5, 6, 7, 8; Exclude the topics not mentioned in the syllabus)
2. William Stallings: Network Security Essentials: Applications and Standards, 3rd Edition, Pearson Education, 2007. (Chapters: 1, 4, 5, 6, 7, 8)

Reference Book:
1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill, 2007.

MICROCONTROLLER-BASED SYSTEMS

Subject Code: 10CS836	**I.A. Marks : 25**
Hours/Week : 04	**Exam Hours: 03**
Total Hours : 52	**Exam Marks: 100**

PART – A

UNIT 1   **7 Hours**
Introduction, 8051 Assembly Language Programming – 1: Microcontrollers and embedded processors; Overview of the 8051 family 8051 Assembly Language Programming (ALP) -1: Inside the 8051; Introduction to 8051 ALP; Assembling and running an 8051 program; The

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PC and ROM space in 8051; Data types, directives, flag bits, PSW register, register banks, and the stack.

UNIT 2   **6 Hours**
ALP – 2: Jump and loop instructions; Call instructions; Time delay for various 8051 family members; I/O programming; I/O bit manipulation programming. Immediate and register addressing modes; Accessing memory using various addressing modes.

UNIT 3   **7 Hours**
ALP – 3 - Programming in C: Bit addresses for I/O and RAM; Extra 128 bytes of on-chip RAM in 8052.Arithmetic instructions; Signed numbers and arithmetic operations; Logic and compare instructions; rotate instruction and serialization; BCD, ASCII, and other application programs. Programming in C: Data types and time delays; I/O programming; Logic operations; Data conversion programs; Accessing code ROM space; Data serialization.

UNIT 4   **6 Hours**
Pin Description, Timer Programming: Pin description of 8051; Intel Hex file; Programming the 8051 timers; Counter programming; Programming Timers 0 and 1 in C.

PART – B
UNIT 5   **6 Hours**
Serial Port Programming, Interrupt Programming: Basics of serial communications; 8051 connections to RS232; Serial port programming in assembly and in C 8051 interrupts; Programming timer interrupts; Programming external hardware interrupts; Programming the serial communications interrupt; Interrupt priority in 8051 / 8052; Interrupt programming in C.

UNIT 6   **7 Hours**
Interfacing LCD, Keyboard, ADC, DAC and Sensors : LCE interfacing; Keyboard interfacing; Parallel and serial ADC; DAC interfacing; Sensor interfacing and signal conditioning

UNIT 7   **7 Hours**
Interfacing to External Memory, Interfacing with 8255: Memory address decoding; Interfacing 8031 / 8051 with external ROM; 8051 data memory space; Accessing external data memory in C. Interfacing with 8255; Programming 8255 in C.

UNIT 8   **6 Hours**

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DS12887 RTC interfacing and Programming, Applications: DS12887 RTC interfacing; DS12887 RTC programming in C; Alarm, SQW, and IRQ features of DS12886 Relays and opto-isolators; Stepper motor interfacing; DC motor interfacing and PWM

Text Books:
1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay: The 8051 Microcontroller and Embedded Systems using Assembly and C, 2nd Edition, Pearson Education,2008.

Reference Books:
1. Raj Kamal: Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education, 2007.
2. Dr. Ramani Kalpathi, Ganesh Raja: Microcontrollers and Applications, 1st Revised Edition, Sanguine - Pearson, 2010.

ADHOC NETWORKS

Sub Code: 10CS841	IA Marks	: 25
Hrs/Week: 04	Exam Hours	: 03
Total Hrs: 52	Exam Marks	: 100

PART – A

UNIT 1 **6 Hours**
Introduction: Ad hoc Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless internet.
UNIT 2

7 Hours
MAC – 1: MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols with reservation mechanisms.

UNIT 3 **6 Hours**
MAC – 2: Contention-based MAC protocols with scheduling mechanism, MAC protocols that use directional antennas, Other MAC protocols.

UNIT 4

7 Hours
Routing – 1: Routing protocols for Ad hoc wireless Networks: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table drive routing protocol, On-demand routing protocol.

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PART- B

UNIT 5

6 Hours

Routing – 2: Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols

UNIT 6   **7 Hours**

Transport Layer: Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

UNIT 7   **6 Hours**

Security: Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

UNIT 8   **7 Hours**

QoS: Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions, network layer solutions.

Text Books:

1. C. Siva Ram Murthy & B. S. Manoj: Ad hoc Wireless Networks, 2nd Edition, Pearson Education, 2005

Reference Books:

1. Ozan K. Tonguz and Gianguigi Ferrari: Ad hoc Wireless Networks, John Wiley, 2007.
2. Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du: Ad hoc Wireless Networking, Kluwer Academic Publishers, 2004.
3. C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Pearson Education, 2002.

SOFTWARE TESTING

Subject Code: 10CS842	**I.A. Marks: 25**
Hours/Week: 4	**Exam Marks: 100**
Total Hours: 52	**Exam Hours: 3**

PART – A

UNIT 1   **6 Hours**
A Perspective on Testing, Examples: Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The NextDate function, The commission problem, The SATM (Simple Automatic Teller Machine) problem, The currency converter, Saturn windshield wiper.

UNIT 2   **7 Hours**
Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing: Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.

UNIT 3   **7 Hours**
Path Testing, Data Flow Testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Definition-Use testing, Slice-based testing, Guidelines and observations.

UNIT 4   **6 Hours**
Levels of Testing, Integration Testing: Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing. A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.

PART – B

UNIT 5   **7 Hours**
System Testing, Interaction Testing: Threads, Basic concepts for requirements specification, Finding threads, Structural strategies and functional strategies for thread testing, SATM test threads, System testing guidelines, ASF (Atomic System Functions) testing example. Context of

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interaction, A taxonomy of interactions, Interaction, composition, and determinism, Client/Server Testing,.

UNIT 6   **7 Hours**
Process Framework: Validation and verification, Degrees of freedom, Varieties of software. Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback. The quality process, Planning and monitoring, Quality goals, Dependability properties, Analysis, Testing, Improving the process, Organizational factors.

UNIT 7   **6 Hours**
Fault-Based Testing, Test Execution: Overview, Assumptions in fault-based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. Test Execution: Overview, from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles, Capture and replay.

UNIT 8   **6 Hours**
Planning and Monitoring the Process, Documenting Analysis and Test: Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, The quality team, Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports.

TEXT BOOKS:
1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008.
   (Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 1314, 15)
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009.
   (Listed topics only from Chapters 2, 3, 4, 16, 17, 20, 24)

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

ARM BASED SYSTEM DESIGN

Subject Code: 10CS843   **I.A. Marks: 25**
Hours/Week: 4   **Exam Marks: 100**
Total Hours: 52   **Exam Hours: 3**

PART – A

UNIT 1   6 Hours
Introduction: The RISC design philosophy; The ARN design philosophy;
Embedded system hardware and software.ARM processor fundamentals:
Registers; Current Program Status Register; Pipeline; Exceptions, interrupts
and the Vector Table; Core extensions; Architecture revisions; ARM
processor families.

UNIT 2   7 Hours
ARM Instruction Set and Thumb Instruction Set: ARM instruction set:
Data processing instructions; Branch instructions; Load-store instructions;
Software interrupt instruction; Program Status Register functions; Loading
constants; ARMv5E extensions; Conditional execution.Thumb instruction
set: Thumb register usage; ARM –Thumb interworking; Other branch
instructions; Data processing instructions; Single-Register Load-Store
instructions; Multiple-Register Load-Store instructions; Stack instructions;
Software interrupt instruction.

UNIT 3   6 Hours
Writing and Optimizing ARM Assembly Code: Writing assembly code;
Profiling and cycle counting; Instruction scheduling; Register allocation;
Conditional execution; Looping constructs; Bit manipulation; Efficient
switches; Handling unaligned data.

UNIT 4   7 Hours
Optimized Primitives: Double-precision integer multiplication; Integer
normalization and count leading zeros; Division; Square roots;
Transcendental functions; Endian reversal and bit operations; Saturated and
rounded arithmetic; Random number generation.

PART - B

UNIT 5   7 Hours
Exception and Interrupt Handling: Exception handling; Interrupts and
interrupt handling schemes

UNIT 6   **7 Hours**
Caches : The memory hierarchy and the cache memory; Cache architecture; Cache policy; Coprocessor 15 and cache; Flusing and cleaning cache memory; Cache lockdown; Caches and software performance.

UNIT 7   **6 Hours**
Memory – 1: Memory Protection Units: Protected regions; Initializing the MPU, cache and write buffer; Demonstration of an MPU system. Memory Management Units: Moving from MPU to an MMU; How virtual memory works; Details of the ARM MMU.

UNIT 8   **6 Hours**
Memory – 2: Page tables; The translation lookaside buffer; Domains and memory access permission; The caches and write buffer; Coprocessor 15 and MMU configuration; The fast context switch extension.

Text Books:
1. Andrew N. Sloss, Dominic Symes, Chris Wright: ARM System Developer's Guide – Designing and Optimizing System Software, Elsevier, 2004.

Reference Books:
1. David Seal (Editor): ARM Architecture Reference Manual, 2nd Edition, Addison-Wesley, 2001.
2. Steve Furber: ARM System-on-Chip Architecture, 2nd Edition, Addison-Wesley, 2000.

SERVICES ORIENTED ARCHITECTURE

Subject Code: 10CS844   **I.A. Marks: 25**
Hours/Week: 4   **Exam Marks: 100**
Total Hours: 52   **Exam Hours: 3**

PART – A

UNIT 1   **7 Hours**
Introduction o SOA, Evolution of SOA: Fundamental SOA; Common Characteristics of contemporary SOA; Common tangible benefits of SOA;An SOA timeline (from XML to Web services to SOA); The continuing evolution of SOA (Standards organizations and Contributing vendors); The roots of SOA (comparing SOA to Past architectures).

UNIT 2   6 Hours
Web Services and Primitive SOA : The Web services framework; Services (as Web services); Service descriptions (with WSDL); Messaging (with SOAP).

UNIT 3   6 Hours
Web Services and Contemporary SOA – 1: Message exchange patterns; Service activity; Coordination; Atomic Transactions; Business activities; Orchestration; Choreography

UNIT 4   7 Hours
Web Services and Contemporary SOA – 2: Addressing; Reliable messaging; Correlation; Polices; Metadata exchange; Security; Notification and eventing

PART – B
UNIT 5   7 Hours
Principles of Service – Orientation: Services-orientation and the enterprise; Anatomy of a service-oriented architecture; Common Principles of Service-orientation; How service orientation principles inter-relate; Service-orientation and object-orientation; Native Web service support for service-orientation principles.

UNIT 6   6 Hours
Service Layers: Service-orientation and contemporary SOA; Service layer abstraction; Application service layer, Business service layer, Orchestration service layer; Agnostic services; Service layer configuration scenarios

UNIT 7   7 Hours
Business Process Design: WS-BPEL language basics; WS-Coordination overview; Service-oriented business process design; WS-addressing language basics; WS-Reliable Messaging language basics

UNIT 8   6 Hours
SOA Platforms: SOA platform basics; SOA support in J2EE; SOA support in .NET; Integration considerations

Text Books:
1. Thomas Erl: Service-Oriented Architecture – Concepts, Technology, and Design, Pearson Education, 2005.

Reference Books:
1. Eric Newcomer, Greg Lomow: Understanding SOA with Web Services, Pearson Education, 2005.

Clouds, Grids, and Clusters

Subject Code: 10CS845   I.A. Marks: 25
Hours/Week: 4   Exam Marks: 100
Total Hours: 52   Exam Hours: 3

PART – A

UNIT - 1   6 Hours
Introduction: Overview of Cloud Computing, Applications, Intranets and the Cloud, When can cloud Computing be used? Benefits and limitations, Security concerns, Regulatory issues

UNIT - 2   6 Hours
Business Case for Cloud, Examples of Cloud Services: Cloud computing services, Help to the business, Deleting the data center. Examples: Google, Microsoft, IBM, Salesforce.com and its uses, Cloud at Thomson Reuters.

UNIT - 3   7 Hours
Technology, Cloud Storage, Standards: Cloud Computing Technology: Clients, Security, Network, Services.
Overview of Cloud storage, Some providers of Cloud storage. Standards: Applications, Clients, Infrastructure, Service.

UNIT - 4   7 Hours
Other issues: Overview of SaaS (Software as a Service), Driving forces, Company offerings: Google, Microsoft, IBM. Software plus Service: Overview, Mobile device integration Local Clouds, Thin Clients, Migrating to the Cloud: Virtualization, Server solutions, Thin clients, Cloud services for individuals, mid-markets, and enterprises, Migration.

PART - B

UNIT - 5   7 Hours
GRID Computing – 1: Introduction: Data Center, The Grid and the Distributed/ High Performance Computing, Cluster Computing and Grid Computing, Metacomputing – the Precursor of Grid Computing, Scientific, Business and e-Governance Grids, Web services and Grid Computing, Business Computing and the Grid – a Potential Win win Situation, e-Governance and the Grid. Technologies and Architectures for Grid Computing: Clustering and Grid Computing, Issues in Data Grids, Key Functional Requirements in Grid Computing, Standards for Grid Computing , Recent Technological Trends in Large Data Grids.OGSA and WSRF: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF (Web

Services Resource Framework), Resource Approach to Stateful Services, WSRF Specification.
The Grid and the Database: Issues in Database Integration with the Grid, The Requirements of a Grid enabled database, Storage Request Broker (SRB), How to integrate the Database with the Grid? The Architecture of OGSA-DAI for Offering Grid Database Services

UNIT - 6   6 Hours
GRID Computing – 2: World Wide Grid Computing Activites, Organizations and Projects: Standards Organizations, Organizations Developing Grid Computing Tool Kits, Framework and Middleware, Grid Projects and Organizations Building and Using Grid Based Solutions.Web Services and the Service Oriented Architecture (SOA): History and Background, Service Oriented Architecture, How a Web Service Works, SOAP and WSDL, Description, Creating Web Services, Server Side. Globus Toolkit: History of Globus Toolkit, Versions of Globus Toolkit, Applications of GT4 – cases, GT4 – Approaches and Benefits, Infrastructure Management, Monitoring and Discovery, Security, Data, Choreography and Coordination, Main Features of GT4 Functionality – a Summary, GT4 Architecture, GT4 Command Line Programs, GT4 Containers.

UNIT - 7   7 Hours
Cluster Computing – 1: Introduction: What is Cluster Computing, Approaches to Parallel Computing, How to Achieve Low Cost Parallel Computing through Clusters, Definition and Architecture of a Cluster, What is the Functionality a Cluster can offer? Categories of Clusters Cluster Middleware: Levels and Layers of Single System Image (SSI), Cluster Middleware Design Objectives, Resource Management and Scheduling, Cluster Programming Environment and Tools. Early Cluster Architectures and High Throughput Computing Clusters: Early Cluster Architectures, High Throughput Computing Clusters, Condor. Setting up and Administering a Cluster: How to set up a Simple Cluster? Design considerations for the Front End of a Cluster, Setting up nodes, Clusters of Clusters or Metaclusters, System Monitoring, Directory Services inside the Clusters & DCE, Global Clocks Sync, Administering heterogeneous Clusters.

UNIT - 8   6 Hours
Cluster Computing – 2: Cluster Technology for High Availability: Highly Available Clusters, High Availability Parallel Computing, Mission Critical (or Business Critical or Business Continuity) Applications, Types of Failures and Errors, Cluster Architectures and Configurations for High Availability, Faults and Error Detection, Failure Recovery, Failover / Recovery Clusters. Performance Model and Simulation: Performance Measures and Metrics, Profit Effectiveness of Parallel Computing through Clusters. Process Scheduling, Load Sharing and Load Balancing: Job Management System

(JMS) Resource Management System (RMS), Queues, Hosts, Resources, Jobs and Policies, Policies for Resource Utilization, Scheduling Policies Load Sharing and Load Balancing, Strategies for Load Balancing, Modeling Parameters Case Studies of Cluster Systems: Beowulf, PARAM.

Text Books:
1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter: Cloud Computing, A Practical Approach, McGraw Fill, 2010.
2. Prabhu: Grid and Cluster Computing, PHI, 2008.

Reference Books:
1. Joshy Joseph, Craig Fellenstein: Grid Computing, Pearson Education, 2007.
2. Internet Resources

MULTI-CORE ARCHITECTURE AND PROGRAMMING

Subject Code: 10CS846   **I.A. Marks   : 25**
Hours/Week : 04   **Exam Hours: 03**
Total Hours : 52   **Exam Marks: 100**

PART - A

UNIT 1   **7 Hours**
 Introduction
The power and potential of parallelism, Examining sequential and parallel programs, Parallelism using multiple instruction streams, The Goals: Scalability and performance portability, Balancing machine specifics with portability, A look at six parallel computers: Chip multiprocessors, Symmetric multiprocessor architectures, Heterogeneous chip designs, Clusters, Supercomputers, Observations from the six parallel computers.

UNIT 2   **6 Hours**
Reasoning about Performance
Motivation and basic concepts, Sources of performance loss, Parallel structure, Performance trade-offs, Measuring performance, Scalable performance.

UNIT 3   **6 Hours**
Examples of Multi-Core Architectures
Introduction to Intel Architecture, How an Intel Architecture System works, Basic Components of the Intel Core 2 Duo Processor: The CPU, Memory Controller, I/O Controller; Intel Core i7: Architecture, The Intel Core i7 Processor, Intel QuickPath Interconnect, The SCH; Intel Atom Architecture.

Introduction to Texas Instruments' Multi-Core Multilayer SoC architecture for communications, infrastructure equipment

UNIT 4   **7 Hours**
Parallel Algorithm Design
Introduction, The Task / Channel model, Foster's design methodology, Examples: Boundary value problem, Finding the maximum, The n-Body problem, Adding data input.

PART – B

UNIT 5   **7 Hours**
Parallel Programming – 1 (Using OpenMP)
Designing for threads: Task decomposition, Data decomposition, Data flow decomposition, Implications of different decompositions; Challenges in decomposition, Parallel programming patters, A motivating problem: Error diffusion.
Threading and Parallel Programming Constructs: Synchronization, Critical sections, Deadlocks, Synchronization primitives: Semaphores, Locks, Condition variables; Messages, Flow Control-Based concepts: Fence, Barrier; Implementation-Dependent threading issues.

UNIT 6   **6 Hours**
Parallel Programming – 2 (Using OpenMP)
Introduction, The shared-memory model, Parallel *for* loops, Declaring private variables, Critical sections, Reductions, Performance improvements, More general data parallelism, Functional parallelism.

UNIT 7   **7 Hours**
Solutions to Common Parallel Programming Problems
Too many threads, Data races, deadlocks, and live locks, Heavily contended locks, Non-blocking algorithms, Thread-safe functions and libraries, Memory issues, Cache-related issues, Avoiding pipeline stalls, Data organization for high performance.

UNIT 8   **6 Hours**
Threading in the Processor
Single-Core Processors: Processor architecture fundamentals, Comparing Superscalar and EPIC architectures.
Multi-Core Processors: Hardware-based threading, Hyper-threading technology, Multi-Core processors, Multiple processor interactions, Power consumption, Beyond multi-core architecture.

NOTE: In order to acquire a sound understanding of the subject, it is desirable for the students to work in the laboratory using OpenMP. The

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hands-on experience would reinforce the concepts learnt in theory. Problems similar to the ones solved in the Algorithms Laboratory can be solved and issues like speed-up achieved can be analyzed in depth. Several free tools are available from companies like INTEL to facilitate such a study.

Text Books:
1. Calvin Lin, Lawrence Snyder: Principles of Parallel Programming, Pearson Education, 2009.
   (Listed topics only from Chapters 1, 2, 3)
2. Michael J. Quinn: Parallel Programming in C with MPI and OpenMP, Tata McGraw Hill, 2004.
   (Listed topics only from Chapters 3, 17)
3. Shameem Akhter, Jason Roberts: Multi-Core Programming, Increasing Performance through Software Multithreading, Intel Press, 2006.
   (Listed topics only from Chapters 3, 4, 7, 9, 10)
4. Web resources for Example Architectures of INTEL and Texas Instruments:
   http://download.intel.com/design/intarch/papers/321087.pdf ;
   http://focus.ti.com/lit/wp/spry133/spry133.pdf

Reference Books:
1. Introduction to Parallel Computing – Ananth Grama et. al., Pearson Education, 2009.
2. Reinders : Intel Threading Building Blocks, O'reilly – 2005
3. David Culler et. al.: Parallel Computer Architecture: A Hardware/Software Approach, Elsevier, 2006.
4. Richard Gerber, Aart J.C. Bik, Kevin B. Smith, Xinmin Tian: Software Optimization Cookbook, High-Performance Recipes for IA-32 Platforms, 2nd Edition, Intel Press, 2006.