

## Final Review

### Section 1: Introduction and Overview

- Brief overview of the ARM processor
  - Register organization
  - ARM Core,
  - pipelining,
  - modules, and registers
- Working with the Tower and tools
  - Flexible development environment
  - Powerful programming tool set



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## Section 2. Memory System Architecture

1. **Concepts of memory hierarchy**
  - Quantitative principles of computer design
  - Speed gap
2. **Cache memory design**
  - Placement, replacement, write back
3. **Cache organization of ARM Processor**
4. **SRAM**
  - Programmable high speed on-chip RAM to store critical data and program
  - Difference between SRAM and Cache?



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## Section 3. Exception Processing

1. **General Exception Steps**
2. **Interrupt priority, interrupt vector, vector table**
3. **Interrupt Controller Module**
  - A set of programmable registers
  - Mask, force, level, and vectors
4. **Peripheral modules using IRQ**



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## Section 4. Power Management

- **Power Management Module**
- **Procedure to enter a low power mode**
- **Most peripheral devices can be individually controlled**



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## Section 5. Direct Memory Access

- **DMA controller**
- **3 ways to activate a channel**
- **Control registers and transfer control descriptor**
- **Configure and start DMA operations**



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## Section 6. Serial Interface and Communications

- **UART**
  - Transmitter, receiver, shift register,
  - baud rate, frame format, parity
  - Interrupt driven
- **Configure and start serial communication**
- **Basic logic of serial interface**
  - Interrupt or DMA



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## Section 7. Wireless Communication and ZigBee Protocol

- **Why ZigBee?**
  - Low cost and low power consumption
  - PAN and HAN applications
- **What is ZigBee?**
  - IEEE 802.15.4 standard at 24GHz band
  - 250Kbps, MAC and Physical layer standards
- **How to Work with ZigBee:**
  - Programming ZigBee using interfaces
  - Write simple applications



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## Sec. 8. LCD Display

- **Freescale embedded GUI and TWR-LCD**
  - D4D, Driver for Display functions
  - Multi layer development
    - User app
    - API
    - D4D level
  - LCD low level, managing comm with LCD and providing basic functions



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## Sec. 9. Coding Concepts

- **Linear code**
  - Definition, theorems
  - Design a code for a given capability
  - CKT design
- **LDPC Code**
- **CRC code**
  - Definition, concepts
  - Error control capability
  - CKT design



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## Sec 10: Advanced Topics: Disk I/O and RAID Architecture

- **Importance of data storage**
- **RAID Architecture**
  - Why RAID, What types of RAID, and How RAIDs work
  - NAND-Gate Flash memory
  - Physical properties and design issues
    - Write amplification
    - Garbage collection
  - Wear leveling



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## Final Lab Report

- **4 pages final report**
  - Introduction and Motivations
  - Design and implementations
  - Results and Analysis
  - Clearly state each partner's role, be specific
- **Email, or thumb drive:**
  - Name your file using your last name
  - All software, programs, and documentation
  - Slides and Posters in two formats: ppt/doc and printable



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