

Name: \_\_\_\_\_

**EEL 6935 – Embedded Systems Midterm 2 – Tuesday, February 12, 2013 - 100 points possible**

*Instructions: Of the 11 questions, answer any 10. I will **only** grade the first 10 that you answer or if you answer more than 10, indicate the 10 that you want me to grade. There is no extra credit for answering additional questions.*

**Design Framework for Partial Run-Time FPGA Reconfiguration**

1. How does partial reconfiguration enable area savings?

**Sharing many tasks on a single FPGA region reduces area requirement**

**Dynamic Phase-based Tuning for Embedded Systems Using Phase Distance Mapping**

2. What is dynamic tuning? List three challenges with dynamic tuning?

**Determine parameter values during runtime; Challenges: large design space, determining best configuration, avoiding intrusion, detecting when new configuration is required.**

**A Single-Pass Cache Simulation Methodology for Two-level Unified Caches**

3. Give two reasons why single-pass cache simulation speeds up the simulation time as compared to iterative simulation.

- 1) **The single-pass cache simulation employs the functional simulation only once to generate the cache access trace.**
- 2) **All cache configurations can be simulated simultaneously during one execution.**

**Assessing Performance Tradeoffs in Undersea Distributed Sensor Networks**

4. What are the two main parameters of the cost function in the undersea sensor network paper?

**Size of field and number of sensors**

**Development of a Satellite Sensor Network for Future Space Missions**

5. Name two of the three technologies to be tested on for the Satellite Sensor Network space mission?

**Adapted IEEE802.11 for inter satellite communication  
Distributed computing applications  
FPGA acceleration  
Running MOEA in space**

### **Delay-Tolerant Networking: An Approach to Interplanetary Internet**

6. Why are standard Internet protocols a poor choice for a delay tolerant network?

**They require too much time in terms of round trips or don't guarantee data arrival.**

### **Harvesting Aware Power Management For Real Time Systems With Renewable Energy**

7. List 3 main challenges in designing the power management for harvesting-aware real time system, in comparison with non-harvesting-aware real time systems.

**Power source availability is not constant**

**Storage is limited due to physical (form factor) limitations**

**Energy availability is unknown and forecasting is complex due to the nature of energy source**

### **Real-Time Scheduling With Regenerative Energy**

8. Explain earliest deadline first algorithm.

**Earliest deadline first (EDF): each time a new ready task arrives, it is inserted into a queue of ready tasks, sorted by their deadlines. If a newly arrived task is inserted at the head of the queue, the currently executing task is preempted.**

### **A Light-Weight Network-On-Chip Architecture For Dynamically Reconfigurable Systems.**

9. How does the placement of modules affect the reconfiguration capability?

**Modules which are capable of being reconfigured and modules which are static have to be clearly separated during placement. This is because we do not want to affect the performance of the entire system during reconfiguring a particular area. Both the modules should be well separated and there should be a bus macro connecting them together to facilitate exchange of information.**

### **Tensilica – The Xtensa Processor Generator**

10. The Xtensa Processor has many configurable parameters/components. List five.

### **Pulling the Pieces Together at AFRL**

11. List three goals laid out in the Space Science and Technology Vector-2 plans.

**a. Total mission cost <\$30M**

**b. Less than one year development time**

**c. Launch in 6 days from call-up**

**d. Rapid integration with new technologies with new plug-n-play standards**

**e. Small operator crews (<4 people)**