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Eighth Semester B.E. Degree Examination, Dec.2013/Jan.2014

Embedded System Design

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1
 - a. List a pair of design metrics that may compete with one another, providing an intuitive explanation of the reason behind the competition. (06 Marks)
 - b. What is marked window? Derive the percentage revenue loss equation for any rise angle, rather than just for 45 degrees. (08 Marks)
 - c. For a particular product, you determine the NRE cost and unit cost to be the following for the three listed IC technologies:
 FBGA: (\$10,000, \$50), ASIC: (\$50,000, \$10), VESL: (\$200,000, \$5).
 Determine precise volumes for which each technology yields the lowest total cost. (06 Marks)

- 2
 - a. List and define three main design technologies. How are the benefits of using each of three different design technologies helpful to designers? (06 Marks)
 - b. What is single-purpose processor? What are the benefits of choosing a single-purpose processor over the general purpose processor? (04 Marks)
 - c. Design soda machine controller, given that soda costs 75 cents and your machine accepts quarters only. Draw the block box view, come with a state diagram and the state table, minimize the logic and then draw the final circuit. (10 Marks)

- 3
 - a. What is meant by pipelining? And why it is used in instruction execution? (06 Marks)
 - b. Explain in detail the general software design tools that are used by embedded system designers. (06 Marks)
 - c. Distinguish in between timer and counter. (04 Marks)
 - d. Explain in detail the operation and initialization sequence of LCD. (04 Marks)

- 4
 - a. Given a 100 MHz crystal-controlled oscillator and a 32-bit and any number of 16-bit terminal-count timers, design a real-time clock that output the date and time down to milliseconds. You can ignore leap years. Draw a diagram and indicate terminal count values for all timers. (06 Marks)
 - b. How to control the speed of DC motor by using PWM? (06 Marks)
 - c. Given an analog input signal whose voltage ranges from -5 to 5V, and 8-bit digital encoding, calculate the correct encoding 1.2V and then trace the successive approximation approach to find the correct encoding. (08 Marks)

PART – B

- 5
 - a. What is interrupt latency? And explain the factors affecting it. (06 Marks)
 - b. Explain briefly the operation of round-Robin with interrupts. (06 Marks)
 - c. How to selecting an software architecture for your system and give the characteristics of various software architecture? (08 Marks)

- 6 a. Describe the function of scheduler with suitable transition diagram. (06 Marks)
- b. Define semaphore and list of tried-and-true ways to mess up with semaphores. (06 Marks)
- c. Explain the role timer function in RTOS. (08 Marks)

- 7 a. Explain in briefly encapsulating semaphores and encapsulating queue. (08 Marks)
- b. Compose $1K \times 8$ ROMs into $2K \times 16$ ROM. (06 Marks)
- c. What are the four main popular serial protocols? And explain the I²C protocol. (06 Marks)

- 8 a. In embedded system how to saving the memory space and power. (10 Marks)
- b. Briefly explain which two rules that is used in interrupt routines in an RTOS. (10 Marks)
