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Eighth Semester B.E. Degree Examination, December 2012
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. What are the characteristics of an embedded system? List the design metrics of such a system. (08 Marks)
- b. Compare three processor technologies, along with block diagrams. (08 Marks)
- c. The design of a Disk drive has an NRE cost of \$100,000 and a unit cost of \$20. How much we have to add, to the cost of each product, to cover the NRE cost, assuming that the number of units sold are i) 100 units ii) 10,000 units. What is the total unit cost? (04 Marks)
- 2 a. Explain RT-level components. (06 Marks)
- b. Explain various steps involved in designing single purpose processor. (06 Marks)
- c. Explain in various events that takes place when a processor executes an instruction. How pipelining improves the execution speed? (08 Marks)
- 3 a. Explain how DC motor is controlled, using PWM? Assuming an 8-bit up-counter, calculate the count to be loaded in cycle-high register to get pulses of 75% duty-cycle. (08 Marks)
- b. Explain how serial communication is achieved using UART. (04 Marks)
- c. Write necessary hardware and function-pseudocode to
 - i) send control word, to initialize LCD display
 - ii) send a character to display on LCD. (08 Marks)
- 4 a. Explain flash memory, SRAM, PSRAM and OTP ROM, highlighting their features. (08 Marks)
- b. What is cache memory? Explain how it helps in improving the speed of execution. (06 Marks)
- c. Explain the protocols I²C and IEEE 802.11. (06 Marks)

PART – B

- 5 a. Explain how interrupt works in micro-processor. With an example, explain the classic shared data problems, when data is shared between an interrupt and a task. (08 Marks)
- b. What is interrupt latency? What are the factors affecting it? (04 Marks)
- c. Explain with example, Round-Robin architecture. What are its limitations? How do you overcome the limitations of RR architecture. (08 Marks)
- 6 a. List the characteristics of four software architectures of embedded system software. (08 Marks)
- b. Explain the following with respect to tasks in RTOS-based embedded system:
 - i) Task status
 - ii) Task data. (12 Marks)
- 7 a. Explain the concept of semaphores. Discuss how it helps in solving shared data problem in embedded system. (08 Marks)
- b. Briefly explain the two rules that the interrupt routines in an RTOS environment must follow. (04 Marks)
- c. Explain the working of message Ques and compare it with pipes. (08 Marks)
- 8 a. What are encapsulating semaphores? Specify their need with an example. (08 Marks)
- b. Explain the methods to save power and memory. (08 Marks)
- c. Write a brief note on hardware-software co-design aspects in embedded system. (04 Marks)

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