Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(VLSI)/SEM-1/MVLSI-105B/2011-12

2011

EMBEDDED SYSTEM FUNDAMENTALS

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

1. Answer *all* the following questions : 7 × 2 = 14

a) What is an embedded system ? Draw the block diagram of an Embedded System ?

b) When do we need RTOS ? When do we need multitasking RTOS ?

c) Compare serial & parallel Communicication In Embedded systems.

d) What is watchdog timer ?

e) What do we mean by System-on-chip (SoC) ?

f) What is 12C ? Explain how the 12C bus is used for a transfer of byte ?

g) What are the advantages and disadvantages of RS-232 series of protocols ?

h) Define ROM image.

GROUP – B

Answer any *four* of the following : $4 \times 14 = 56$

2. a) Define design metrics in embedded system. What are the different competing design metrics ? What are the constraints of embedded system design ?

   b) How is power dissipation optimized ?

   c) What are the challenges faced in designing an embedded system ? $3 + 2\frac{1}{2} + 2\frac{1}{2} + 3 + 3$

3. a) Classify embedded system into small scale, medium scale and sophisticated systems.

   b) What are the features of CAN protocol and how it makes suitable for embedded application ?

   c) How the data is transfered in IIC interfaces technique ?

   d) What are the advantages of Blue tooth over IRDA and how does the communication take place between devices in Bluethooth ? $4 + 4 + 2 + 4$

4. a) What is a single-purpose processor ? What are the benefits of choosing a single-purpose processor against a general-purpose processor ? Draw the basic architecture of single-purpose processor.

   b) Compare the general purpose processor, micro controller and Digital signal processor.

   c) What is hardware / software co-design ?

   d) Explain the three types of cores such as hard, soft and firm cores. Show the correspondence of the three types of cores with Gazki's Y-chart. $4 + 3 + 3 + 4$

5. a) Describe the working of LCD Controllers with appropriate diagrams.

   b) Describe the working of Keypad controller's configurations in detail. 7 + 7

6. a) Define hard-real time and soft-real time embedded systems. Give any two examples for each of these two categories. What are the characteristics of embedded system ?

   b) Discuss various steps involved in the development of an embedded system life cycle with a diagram. Explain in detail the embedded system design process.

   c) Explain the various hardware functional blocks of a typical microcontroller.

   d) List the memory units and processor needed in a smart card. 2 + 1 + 2 + 4 + 3 + 2

7. a) Differentiate between embedded transducers and embedded sensors. What are the design issues needed to design an embedded sensor ?

   b) What is a timer ? Why do you need at least one timer device in an embedded system ?

   c) Compare Harvard and Princeton memory organization. What are the special structural units in processors for digital camera ? 3 + 3 + 3 + 2 + 3

8. Write short notes on any *four* of the following : $4 \times 3\frac{1}{2}$

a) SRAM and DRAM

b) Device driver

c) ASIP

d) Memory

e) DSP Processors

f) Microcontrollers

g) Emulator ROM

h) FPGA.