



Name :

Roll No. :

Invigilator's Signature :

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

2011

EMBEDDED SYSTEM FUNDAMENTALS

Time Allotted : 3 Hours

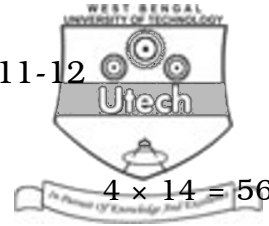
Full Marks : 70

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 : $7 \times 2 = 14$
- 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 Communication In Embedded systems.
 - d) What is watchdog timer ?
 - e) What do we mean by System-on-chip (SoC) ?
 - f) What is I2C ? Explain how the I2C 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 transferred 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

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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.

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