Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (ECE)/SEM-1/MVLSI-105-B/2010-11

2010-11
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

(Objective Type Questions)

1. Answer the following very briefly : 10 × 1 = 10

   i) What do you mean by Hard Macro and Soft Macro ?

   ii) What is Watchdog Timer ? State its importance in connection with Embedded systems.

   iii) Distinguish between embedded computing and distributed computing.

   iv) Compare Von Neumann and Harvard Architecture of a processor based system.

   v) Distinguish between Embedded computing and Distributed computing.

   vi) Differentiate between Assembler and Compiler.

vii) Differentiate between Fixed Point Processor and Floating Point Processor.

viii) How do you define dead line requirements in connection with embedded system design ?

ix) Why Universal Time Code (UTC) is important in contrast to Timing & Synchronization ?

x) Pulse Width Modulation (PWM) as a building block is an essential resource in Embedded systems. Explain.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Demonstrate how a Pulse Width Modulator (PWM) could be used as a Digital to Analog Converter (DAC).

3. Write a VHDL/Verilog Program for a four-bit multiplier logic circuit and highlight the simulated waveforms.

4. Implement a hardware for one cycle Multiply accumulate instruction often used in a DSP processor.

5. Briefly explain the SPI protocol widely used in embedded system.

6. Implement a Digital Phase Locked Loop (DPLL) to capture signal from 1 kHz to 20 kHz with a lock range of 100 Hz. Use 8-bit resolution to control the DPLL.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Briefly explain the organization of an Embedded system highlighting details of processor cores, memory cores, analog cores along with Analog/Digital I/O ports. 10

   b) Highlight the Embedded System life cycle and discuss the issues of Design Challenge. 5

8. a) Briefly explain the I2C protocol widely used in embedded networking. 10

   b) Briefly explain Hard Real Time and Soft Real time systems in contrast to embedded systems. 5

9. Write a C51 code based on Keil PK-51 IDE for interfacing a Stepper motor. The angular speed of motor will be 1·8 degree/sec with provision for generating clockwise or anti-clockwise rotation. Also show the details of interfacing from PC to the embedded hardware board based on PK-51. 15

10. Describe briefly the internal architecture of Intel 8051 as an example of 8-bit Embedded Microcontroller with a block schematic representation. 15

OR

Briefly explain the functional block diagram of an **OMAP Processor** used in **NOKIA mobile handset** as an example of a complete Embedded system. 15

11. a) Discuss briefly on the importance of programming tools (Hardware/Software) available in the embedded domain for the purpose of Hardware/Software integration, embedded debugging and code optimization & implementation. 10

b) Describe Intel Hex File format for downloading the Program Code to a Target Hardware. 5

12. Write short notes on any *three* of the following : 3 × 5

a) Device driver

b) IEEE single precision floating point format

c) System on Chip (SoC) Design

d) Integrated Development Environment (IDE)

e) Boot Loader

f) IEEE 1588 Standard.