

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.



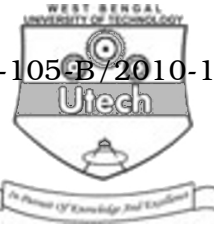
- vii) Differentiate between Fixed Point Processor and Floating Point Processor.
- viii) How do you define dead line requirements in connection with embedded system design ?
- ix) Why Universal Time Code ( UTC ) is important in contrast to Timing & Synchronization ?
- x) Pulse Width Modulation ( PWM ) as a building block is an essential resource in Embedded systems. Explain.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

- 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.  $3 \times 15 = 45$

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.
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