



Name :
Roll No. :
Invigilator's Signature :

CS/M.Tech (ECE)/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

(Objective Type Questions)

1. Answer the following questions in brief: $10 \times 1 = 10$
 - a) What do you mean by Assembler and Compiler ?
 - b) Define Intellectual Property (IP) Core in contrast to Embedded Systems.
 - c) Distinguish between Operating Systems (OS) and Monitor Programs.
 - d) Harvard Architecture is superior over Von-Neumann Architecture— Explain in detail.
 - e) Distinguish between Sensor and Transducer.
 - f) Differentiate between Arithmetic Logic Unit (ALU) and Floating Point Unit (FPU).
 - g) What are meant by Fixed Point Processor and Floating Point Processor ?



- h) In the Measurement World, Precision and Range could not be maximized at the same time — Explain the validity of this statement.
- i) Highlight the importance of Universal Time Code (UTC) in contrast to the Timing & Synchronization issues in an embedded systems.
- j) What do you mean by floating gate technology used to implement PROM / EPROM based memory modules in embedded processors ?

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 to control the speed of a DC motor in motor control application.
- 3. Write a VHDL / Verilog Program for a Four-bit Parallel Adder Logic Circuit and highlight the simulated waveforms.
- 4. Explain the various types of Primary Memories used in the processing world. Also highlight the Programmable Read Only Memory (PROM) technology for embedded applications.
- 5. Briefly explain the 12C protocol widely used in embedded systems.



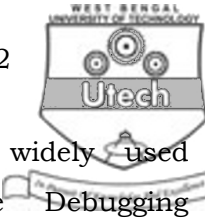
6. Propose the Architecture of an Embedded Processor needed specially for Seismic Signal Processing Applications to primarily process and monitor the Intensity of Earthquake in Richter Scale along with the information about Epicenter minutes after the incident of Earthquake. The processor must support Distributed Computing & Networking around the Globe in Instruction Level to accomplish the task.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Briefly outline the organization of a generic Embedded System highlighting details of Processor Cores, Memory Cores, Analog Cores along with Analog/Digital I/O ports. 10
- b) Classify Embedded System in four major segments as (1) Signal Processing Applications, (2) Mission Critical Applications, (3) Distributed Applications and (4) Small Applications and discuss relative issues in each of the segment in regard to (a) Computing Speed, (b) I/O Transfer Rate, (c) Memory Size, (d) Development Cost, (e) Life span of the systems and (f) Environmental Issues and (g) Issues related to the maintainability of the systems. 5



8. a) Briefly explain the SPI protocol widely used in embedded Hardware / Software Debugging / Development environment. 10
- b) Highlight the basic features of General Purpose Operating Systems (OS) and Real Time Operating Systems (RTOS). 5
9. Describe briefly the Memory Organization of Intel 8051 microcontroller as an example of 8-bit Embedded Microcontroller and discuss different Addressing Modes supported by the Processor.
10. Briefly explain the functional block diagram of TMS320C5X series of DSP Processors used extensively in Signal Processing Applications.
11. a) Discuss briefly on Hardware / Software Development Tools used in the embedded domain. What is Code Composer Studio (CCS) for DSP ? Explain the basic features of CCS as an IDE. 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) Integrated Development Environment (IDE)
 - b) IEEE Double Precision Floating Point Format
 - c) Soft Core Processor
 - d) Real Time Operating Systems (RTOS)
 - e) Boot Loader feature in Embedded Processor
 - f) RS-232C Communication Standard.