Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/EIE/SEM-8/EC-802B/2013

2013

EMBEDDED SYSTEM

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
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) The main function of RTOS is

a) real time task scheduling and interrupt latency control

b) process management

c) device management

d) memory management.

ii) Which of the following device is not an embedded system ?

a) Cellphone b) Mainframe

c) Modem d) Automobile.

iii) Automobile engine control system is the example of

a) soft real time b) hard real time

c) firm real time d) none of these.

iv) Which of the following is volatile memory ?

a) EEPROM

b) SRAM

c) NV-RAM

d) Flash memory EPROM.

v) A microcontroller unit must have

a) oscillator and reset circuits

b) oscillator, reset, watchdog and linear circuits

c) oscillator circuits

d) external memory interfacing circuits.

vi) A program that combines object code files into an executable program is called a/an

a) compiler b) linker

c) loader d) assembler.

vii) I^2C bus stands for

a) intra IC connect bus

b) interface IC connect bus

c) inter IC connect bus

d) none of these.

viii) The number of bit of microcontroller in sophisticated embedded system is

a) 8 or 16 b) 16 or 32

c) 32 or 64 d) none of these.

ix) MAC unit is present in which type of processor ?

a) ARM processor b) DSP processor

c) ASIP processor d) None of these.

x) In distributed embedded controller which type of bus is used ?

a) CAN bus b) I^2C bus

c) USB bus d) None of these.

xi) Architecture used in DSP processor is

a) Von Neumann b) Harvard architecture

c) SIMD d) All of these.

xii) Let h be the hit rate, M be the miss penalty, C be the time to access information in the cache. The average access time experienced by the processor is

a) $t_{avg} = (1 - h)\,C + (1 - h)\,M$

b) $t_{avg} = h\,C + (1 - h)\,M$

c) $t_{avg} = (1 - h)\,C + h\,M$

d) $t_{avg} = h\,C + h\,M$.

GROUP – B
(Short Answer Type Questions)

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

2. What are the aspects of a processor do you consider useful for designing a small embedded application ?

3. Demonstrate how a Pulse Width Modulator (PWM) could be used as a Digital to Analog converter (DAC) for integration with an embedded processor.

4. Implement a hardware for one cycle Multiply-Accumulate Instruction often used in a DSP processor.

5. Describe briefly the internal architecture of Intel 8051 as an example of 8-bit embedded microcontrller with a block schematic representation.

6. Explain the need of watchdog timer and reset after watch time.

GROUP – C
(Long Answer Type Questions)

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

7. a) Compare SRAM and DRAM.

   b) What is the difference between standard write & late write in SRAM ?

   c) What is meant by dynamic power loss of SRAM ?

   d) Name and explain different reading mechanisms of SRAM from the memory with timing diagram.

   3 + 3 + 3 + 6

8. What do you mean by pipelining ? How is this concept implemented in ARM core processor ? Describe different modes of ARM core. 4 + 6 + 5

9. a) What is cache memory ? What are its importance ?

   b) What is direct map cache ? Write down the problems associated with this.

   c) Discuss the different characteristics of DSP processor.

   (3 + 2) + 4 + 2 + 4

10. a) What is ARM processor ? Describe different stages of ARM processor.

    b) Explain ARM architecture. 1 + 7 + 7

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

    a) Full-Custom (VLSI) IC technology

    b) IEEE double precision floating point format

    c) Photolithography technique

    d) EPROM

    e) RTOS for mobile communication.