Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER–V • EXAMINATION – WINTER 2013

Subject Code: 650012 Date: 30-11-2013

Subject Name: Software Development for Embedded Systems

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)**

1. What is a single-purpose processor? What are the benefits of choosing a single-purpose processor over a general-purpose processor? **03**
2. What is the difference between synchronous and asynchronous circuit? Determine whether the following are synchronous or asynchronous: **04**
   (a) multiplexer (b) register

(b) Explain Embedded software development process with proper diagram. **07**

Q.2 **(a)** For a particular product, you determine the NRE cost and unit cost to be the following for the three listed IC technologies: FPGA: ($10,000, $50); ASIC: ($50,000, $10); VLSI: ($200,000, $5). Determine precise volumes for which each technology yields the lowest total cost. **07**

(b) Design 3x8 decoder. Start from a truth table, use K-maps to minimize logic and draw the final circuit. **07**

OR

(b) 1. Briefly define EEPROM, SRAM, DRAM **03**
2. Compose 1Kx 8 ROM into an 8Kx 8ROM **04**

Q.3 **(a)** Add one instruction to the instruction set to the following instruction set that would reduce the size of our summing assembly program by 1 instruction:. **07**

```
MOV Rn,direct
MOV direct,Rn
MOV @Rn,Rm
MOV Rn,#immed
ADD Rn,Rm
SUB Rn,Rm
JZ Rn,relative
```

(b) Explain the role of Cross-Compiler, Cross-Assembler and Linker/Locator for embedded software. **07**

OR

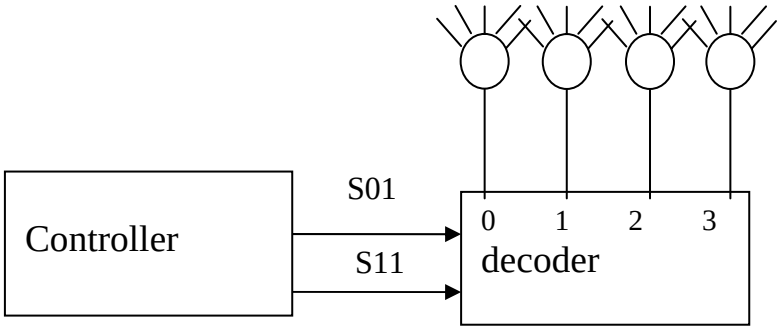
Q.3 **(a)** Design a circuit that does the matrix multiplication of matrices A and B. Matrix A is 2x2 and matrix B is 2x2. The multiplication works as follows: **07**

$$\begin{bmatrix} A \\ a & b \\ c & d \end{bmatrix} \bullet \begin{bmatrix} B \\ g & h \\ j & k \end{bmatrix} = \begin{bmatrix} C \\ a*g+b*j & a*h+b*k \\ c*g+d*j & c*h+d*k \end{bmatrix}$$

(b) Explain test system for Embedded System with diagram. **07**

Q.4 **(a)** Explain all the five methods for transferring file into target system. **07**

(b) Four lights are connected to a decoder. Build a circuit that will blink the lights in the following order: 1, 2, 1, 3, 0, 2,… Start from a state diagram, draw the state table, minimize the logic, and draw the final circuit. **07**



OR

Q.4 **(a)** 1.Discuss the advantages and disadvantages using Memory-mapped I/O versus Standard I/O. **04**

2. Explain the benefits that Interrupt address table has over fixed and vectored interrupt method. **03**

Q.4 **(b)** Design an Extended Parallel I/O Peripherals.Provide (i) a State-machine description and (ii) a Structural Description **07**

Q.5 **(a)** Write a Note on Instruction Set Simulator. **07**

(b) Convert 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6,1.7,1.8 and 1.9 to fixed-point representation using (i) two-bits for the fractional part (ii) three-bits for the fractional part **07**

OR

Q.5 **(a)** Write a short note on Logic Analyzers. **07**

(b) Write two C routines that, each, takes as input two 32-bit fixed point numbers and perform addition and multiplication using 4-bits for the fractional part and the remaining bits for the whole part. **07**

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