Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.C.A.- SEMESTER – V • EXAMINATION – WINTER 2012

Subject code: 650012 Date: 29-12-2012

Subject Name: Software Development for Embedded Systems (SD-ES)-Elective-III

Time: 10:30 am – 1:00 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)**	(i)	Describe briefly common distinguishing characteristics of embedded systems.	**04**
		(ii)	Define Timer and Counter. Explain their functioning and their characteristics.	**03**
	(b)	(i)	Briefly explain Basic Architecture of General-Purpose Processor.	**04**
		(ii)	List down Common Design Metrics along with their meaning.	**03**

Q.2 **(a)** Explain different IC technologies (including Trends) giving basic characteristics and distinguishing features of each technology. **07**

(b) Briefly describe RT-Level Sequential Components and Sequential Logic Design. **07**

OR

(b) Design a circuit that does the matrix multiplication of matrices A and B. Matrix A is 3x2 and matrix 2x3. The multiplication works as follows: **07**

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

Q.3 **(a)** Explain Design flow and Tools under Development Environment for Embedded Software Development with diagram. **07**

(b) Explain Pulse Width Modulator (PWM). Describe the application of PWM in controlling a DC Motor. **07**

OR

Q.3 **(a)** What is Application-Specific Instruction-Set Processor (ASIP)? Describe briefly (i) Microcontrollers and (ii) Digital Signal Processors (DSPs), which are two major types of ASIPs. What is the selection criteria for a microprocessor? **07**

(b) What is Universal Asynchronous Receiver / Transmitter (UART)? Write down its basic characteristics. Describe its functioning including the functioning of receiver and that of transmitter. What are the configuration requirements before using UART? **07**

Q.4 **(a)** Draw a diagram showing an example of Memory Hierarchy. Describe briefly the three Cache Mapping Techniques. What are their relative merits and demerits? **07**

(b) Explain in brief Parallel Communication, Serial Communication and Wireless Communication including its basic characteristics and advantages. **07**

OR

Q.4	**(a)**	(i)	Explain EPROM including its functioning and internals. What are its advantages over OTP RAM?	**04**
		(ii)	What are two basic types of Random-Access Memory (RAM)? Describe briefly SRAM and DRAM.	**03**

	(b)	(i)	Describe two Protocol Control methods, namely Strobe and Handshake including their characteristics and relative merits and demerits.	**04**
		(ii)	There are two common methods for using pins to support I/O – Port based I/O and Bus-based I/O. Briefly explain both these methods.	**03**
Q.5	**(a)**		Give some reasons for doing actual programming work for embedded systems on a Host system rather than on a target system. Explain Cross-Compiler, Cross-assembles, Linker/Locators for Embedded software.	**07**
	(b)		What is Instruction Set Simulators? What does it simulate? What are the abilities and shortcomings of Simulators? How the shortcomings are compensated for?	**07**

OR

Q.5	**(a)**	What are different methods of getting the image of the target software (for embedded systems) into the target system? Explain these methods	**07**
	(b)	Describe briefly In-circuit Emulators, and Software-only Monitors.	**07**

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