

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**

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

- 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**
