(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0387 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VIII) THEORY EXAMINATION 2010-11

EMBEDDED SYSTEMS

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt **all** questions. All questions carry equal marks.

(2) Be precise in your answer. No second answer book will be provided.

1. Attempt any **two** parts of the following : **(10×2=20)**

(a) What is an embedded system ? List and define the three main characteristics of embedded systems that distinguish such systems from other computing systems.

(b) Design a single-purpose processor that gives output of Fibonacci numbers up to n places. Start with a function computing the desired result, translate it into a state diagram, and sketch a probable data path.

(c) (i) Create a table listing the address spaces for the following address sizes :

(a) 8–bit

(b) 16–bit

(c) 24–bit

(d) 32–bit

(e) 64–bit.

(ii) Describe in short

(a) Assemblers

(b) Compilers

(c) Linkers.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) With the aid of a block diagram explain the operation of an 8051 UART device. Write an 8051 assembly language subroutine which will transmit an 8 bit data character via the serial port. A ninth bit is to be used as an even parity bit. Your program must insert the correct parity bit.

(b) (i) Explain interrupt polling in 8051.

(ii) Find the time of a timer in mode 1 to overflow if initially set to 03Ah with a 6 megahertz crystal.

(c) (i) Discuss the different power-saving modes of 8051.

(ii) Explain the 8051 addressing modes of 8051 with examples.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) (i) Find the baud rate for the serial port in mode 0 for a 6 MHz crystal.

(ii) Write a program to transfer your name at 4800 baud, 8-bit data and 1 stop bit, continuously. Assuming crystal frequency 11.0592 MHz.

(b) (i) Explain RISC and CISC processors.

(ii) Draw the generalized functional block diagram of a microcontroller specifying each block.

(c) (i) Explain the control signals of 8051.

(ii) Why microcontrollers are preferred for controlling operations ? Explain

4. Attempt any **one** part of the following : **(20×1=20)**

(a) For real time operating system, define the following :

(i) Semaphores

(ii) Operating system services

(iii) Mailboxes

(iv) Tasks

(v) States.

(b) Describe ARM. Also give the architectural features of 80386 and 80486.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) (i) How Push buttons are connected to 8051 ? Explain.

(ii) Explain the benefits that an interrupt address table has over fixed and vectored interrupt methods.

(b) Rotate a stepper motor through 90° in clockwise direction and then by 180° in anticlockwise direction. Step angle of this motor is 1.8°. Show hardware connection and write software to meet the requirement.

(c) Draw a block diagram of a processor, peripheral, and DMA controller connected with a system bus, in which the peripheral transfers 100 bytes of data to the memory using DMA. Show all relevant control and data lines of the bus, and label component inputs/ outputs clearly. Draw a timing diagram showing what happens during the transfer; skip the 2nd through 99th bytes.