Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: EMBEDDED SYSTEMS [ICT 3102]

REVISED CREDIT SYSTEM
17/11/2017

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

1A. Explain the following ARM instructions with an example to each: 5
i) RRX ii) SMLAL iii) TST iv) RSB v) BHS

1B. Assume that a switch is connected to P2.10. Write an embedded C program to generate a sinusoidal waveform at A_{OUT} (P0.26 , function-3) with peak to peak amplitude of 3.3 volts and frequencies as follows: 3

Frequency	Switch status
2 kHz	ON
4 kHz	OFF

1C. Differentiate between 2
i) Microprocessor and microcontroller
ii) Timer and Counter

2A. Write an embedded C program to transfer the message "MIT Diamond Jubilee " serially on TxD0 (P0.2 , function 2), at 9600 baud. Assume 1-start bit, 1- stop bit and 8-bit data (PCLK=3 MHz) 5

2B. With a neat diagram, explain the stepper motor interfacing to ARM microcontroller. Write an embedded C program to rotate the motor 20 steps in the clockwise direction. 3

2C. Given PCLK=1 MHz and PR=0. Determine the value to be loaded to MR1 to get a square waveform of frequency 20 Hz on MAT 1.1. 2

3A. Assume that columns of a 3x3 matrix keyboard are connected to P2.0-P2.2 and rows are connected to P1.0-P1.2, write an embedded C program using GPIO interrupts to display the key code of the key pressed on a seven segment display. 5

3B. Differentiate between software and burst mode operation of an ADC. Explain the steps involved in converting many analog channels into digital using these methods. 3

3C. Define the terms : 2
i) Resolution of a DAC
ii) Memory mapped IO

4A. What is "Pulse Width Modulation"? With a neat diagram, explain the Pulse Width Modulation module of ARM microcontroller. 5

4B. Write an assembly language program to find the LCM of two unsigned 32-bit binary numbers in the data memory and store the result in the data memory. 3

4C. Explain the following addressing modes of the ARM microcontroller with an example for each.

i) Pre Indexed
ii) Post Indexed 2

5A. Write an embedded C program using interrupts to generate a square waveform of frequency 200 kHz with 75% duty cycle on P0.2 using TIMER-0 while simultaneously displaying the number of pulses received at EINT1(P2.11 , function 2) on the common anode seven segment display connected to P0.10 – P0.3. (PCLK = 3 MHz) 5

5B. With a neat diagram, explain how an 8-bit 16x2 LCD can be interfaced to ARM microcontroller. 3

5C. List the salient features of CISC family of microcontrollers. 2