Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SECOND SEMESTER M.TECH (DEAC & ME) DEGREE END SEMESTER EXAMINATION
MAY / JUNE 2016
SUBJECT: EMBEDDED SYSTEM DESIGN (ECE - 554)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. List the design methods used for designing different processors. The state diagram of a control unit is shown in **FIGURE 1A**. Design the control unit using counter, decoder and the sequence controller.

1B. Explain the two types of maintenance with a suitable example. The MTTR of a printer is 3days and its availability is 90%. Calculate its MTBF.

1C. Write one valid difference between the following.
a) Semi-custom and full custom IC technology.
b) Embedded systems based on triggering

(5+3+2)

2A. Two switches are connected to P1.1 and P1.2 respectively and eight LEDs are connected to Port 2 of 8051 Microcontroller. Write an embedded C program to display the following on the LEDS based on the switch pressed.

Sw1	Sw2	Display in LEDs
0	0	Johnson counter
1	1	Ring counter
Any other combination		Individual LEDs should glow alternatively.

2B. Explain the following:
(a) Brown-out protection circuit
(b) Watch dog timer
(c) ZigBee

2C. The PPI is programmed as 82h. Write its significance.

(5+3+2)

3A. Three processes with process IDs P1, P2 and P3 with estimated completion time 10, 5, 7 milliseconds enters the ready queue together. Process P4 with estimated completion time 2ms enters the ready queue after 2ms. Calculate the waiting time, TAT, average waiting time and average TAT if the following scheduling algorithms are used in scheduling the processes.
(a) Non-pre-emptive SJF scheduling
(b) Pre-emptive SRT scheduling
(c) Which scheduling algorithm gives a better performance?

3B. Identify the following:

(a) A technique used by the firmware running on the target device for modifying a selected portion of the code memory.

(b) They execute on development processor but generate code for target processor.

(c) They download a binary machine program from the development processor's memory into the target processor's memory.

3C. Draw the state machine model for a process life cycle.

(5+3+2)

4A. Explain the status register of PIC16F877. List out the conditions required to reset PIC16F877.

4B. With a neat diagram explain the JTAG based boundary scanning for hardware testing.

4C. (a) Bluetooth operates at ……..Hz of the Radio Frequency spectrum and uses the ……. technique for communication.

(b) In I2C the ……. line is responsible for generating synchronization clock pulses and ….. is responsible for transmitting the serial data across devices.

(5+3+2)

5A. Consider the instruction LDR r1, [r2],#0x4. Draw the data path activity illustrating the execution of the instruction. Also write the operations taking place in each cycle.

5B. Write an assembly language program to find the largest number in an array of 10 numbers stored at the location 0x23000000.

5C. Mention the similarity and difference between AHB and ASB.

(5+3+2)

6A. Explain with a neat diagram the different phases of EDLC.

6B. Given r3=0x04 and r5=0x0B. What would be the contents of r3 and r5 registers in each of the following cases after the Thumb instruction is executed.

(a) SUB r3,r5

(b) CMP r3,r5

(c) MVN r3,r5

(d) NEG r3,r5

(e) AND r3,r5

(f) TST r3,r5

6C. List the different power reduction techniques used in designing low power embedded systems.

(5+3+2)

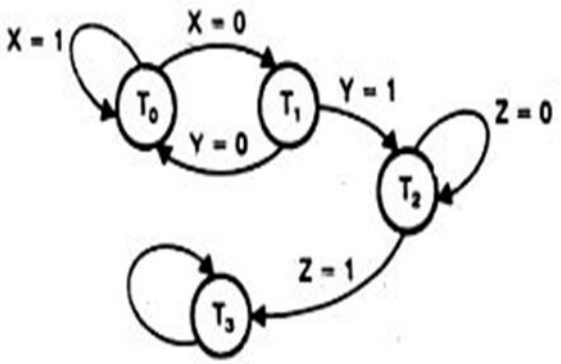

FIGURE 1A