Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, JULY 2016

SUBJECT: EMBEDDED SYSTEMS [ELE330]

REVISED CREDIT SYSTEM

Time: 3 Hours 04 JULY 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.
- Support all your programs with relevant comments.

1A. Describe the following with respect to 8086 processor
   i. Functions of all the used bits (condition flags and control flags) of flag register
   ii. Instruction byte queue ***04***

1B. With the help of relevant examples, explain the following addressing modes of 8086 instruction set
   i. Direct addressing mode
   ii. Register indirect addressing mode
   iii. Intra segment direct addressing mode for branching operation. ***03***

1C. Internal marks scored by 24 students in Embedded systems subject (maximum marks: 50) are stored in successive locations starting at 50000H in the data segment. Write an 8086 ALP to copy these data to successive memory locations starting at 60000H in the extra segment. Use relevant string manipulation instruction of 8086. ***03***

2A. List and compare the salient features of Intel 80286, 80386 and 80486 processors ***03***

2B. Describe the following benchmarks used to determine and compare the processing power of processors
   i. Dhrystone Benchmark
   ii. EEMBC ***04***

2C. Write a note on instruction mix analysis done on CISC main frame and mini frame computers and hence the development of RISC processor architecture. ***03***

3A. List and describe the various shift and rotate operations supported by ARM7TDMI instruction set. Illustrate with an example. ***03***

3B. What do you mean by nested subroutine? With the help of an example, describe the ARM7TDMI instructions for calling and returning from subroutines, in case of nested subroutines. ***04***

3C. Write an ARM7 subroutine to obtain the factorial of an unsigned number passed to the subroutine through R0 register; return the result through R1 register. (Number can be any number between '0' and '10') ***03***

4A. List the various ARM7TDMI exceptions and explain the sequence of operation in ARM7 when an exception occurs. ***03***

4B. Following 'C' code was used to clear 250 half word locations (500 bytes) in memory. Translate it to ARM assembly program. Use suitable registers and memory address.

```
for ( int  i=0; i < 100; i++)
    {
        a[i] = 0;
    }
```

03

4C. Discuss the necessity of Cache memory in embedded systems. With the help of a relevant memory hierarchy diagram, explain the memory read operation, in a system with two levels of cache. Write a note on the current trend and developments with respect to cache memory in general purpose and embedded systems. ***04***

5A. Compare RS232, RS422 and RS 485 serial communication standards. ***03***

5B. Explain the PCI bus protocol with the help of relevant timing diagram with respect to memory write operation. Assume '4', '16' bit data transferred in the data phase; Target requests for one wait cycle during second data, initiator requests for one wait cycle during third data and no wait cycles during first and fourth data. Clearly explain the functions of all the signals involved in the data transfer. ***04***

5C. Explain clearly the protocol used for data communication by I2C serial communication bus. ***03***

6A. Describe the Bluetooth protocol for wireless communication. ***04***

6B. Discuss the necessity of watchdog timers in embedded systems. With the help of a relevant pseudo code, explain the working of ATM timeout using WDT. ***03***

6C. List the specifications of on chip ADC of PIC16f877 and describe the algorithm (steps in programming) for converting analog value to digital using on chip ADC of PIC16f877. ***03***