Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SIXTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION

JUNE 2019

SUBJECT: EMBEDDED SYSTEM DESIGN (ECE - 4003)

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

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Define various operational quality attributes of the embedded system.

1B. List and define the three main processor technologies. What are the benefits of using each of the three different processor technologies?

1C. What is NRE cost? Create a graph with the x-axis the number of units and y-axis the product cost. Plot the per-product cost function for an NRE cost of $50,000 and a unit cost of $5.

(4+3+3)

2A. With what aspects are the followings different:

(a) RISC and CISC architecture (b) Harvard and Von-Neuman architecture.

(c) Big Endian and Little Endian addressing (d) SRAM and DRAM

2B. Draw the power on reset circuitry for a typical microcontroller. Explain why it is required.

2C. Write the different stepping modes of bipolar stepper motor and give the table for the same.

(4+3+3)

3A. Explain the four ways in which the data can be transferred in USB protocol.

3B. Represent and explain possible states and state transitions of the processes of an Operating system with the help of state machine diagram.

3C. Explain the following terms of OS scheduling

i. Starvation ii. Priority Inversion iii. Priority Inheritance

(4+3+3)

4A. Three processes with process ID's P1, P2, P3 with estimated time 7,9,3 milliseconds respectively enters the ready queue together. Process P4 with estimated execution completion time 4ms enters the ready queue after 1ms. Process P5 with estimated execution time 10ms enters the ready queue after 6ms. Calculate the waiting time and TAT for each processes. Also calculate average waiting time and average TAT in the non-pre-emptive SJF scheduling. What are the drawbacks of SJF scheduling?

4B. Design an automatic tea/coffee vending machine based on FSM model for the following requirement. The tea/coffee vending is initiated by user inserting a 5 rupee coin. After inserting the coin, the user can either select 'Coffee' or 'Tea' or press 'Cancel' to cancel the order and take back the coin.

4C. Draw the data flow graph for the equation used to find area and circumference of a circle.

(4+3+3)

5A. Write differences between the following:
i) Development Processor and Target Processor
ii) Compiler and Cross-Compiler
iii) Debugger and Emulator
iv) Out-of-circuit programming and In System Programming of target board

5B. What is EDLC? What is its significance? List out its objectives.

5C. Explain three commonly used firmware embedding techniques for a non-OS based embedded system.

(4+3+3)