# Question Paper

Exam Date & Time: 19-Jun-2024 (02:30 PM - 05:30 PM)

## MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JUNE 2024

**MICROCONTROLLERS [ICE 2222]**

**Marks: 50** **Duration: 180 mins.**

**Answer all the questions.**

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

| | | | |
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| 1) | | Explain the process of decoding the keypress in case of a 4x4 matrix keypad.[CO5, PO 1,2,3,4,5,12 BL2] | (2) |
| | A) | | |
| | B) | Explain the unique features of 8051 microcontroller with help of a neat block diagram. [CO1, PO 1 BL2] | (3) |
| | C) | Develop a subroutine function which introduces a delay dependent on the value in Register R0. Introduce the subroutine to toggle the bits of port 1. [CO2, PO 1,2,3,5 BL4] | (5) |
| 2) | | Assume that after reset, the interrupt priority is set by the instruction "MOV IP, #00001100B". Discuss the sequence in which the interrupts are serviced. [CO3, PO 1,2,3,5 BL3] | (2) |
| | A) | | |
| | B) | Demonstrate the THUMB entry and THUMB exit procedure with suitable example. [CO4, PO 1,2,3,4,12 BL2] | (3) |
| | C) | Generate from all pins of Port 0, a square wave which has half the frequency of the signal applied at INT0 pin. [CO3, PO 1,2,3,5 BL3] | (5) |
| 3) | | Interpret what happens if interrupts INT0, TF0, and INT1 are activated at the same time. Assume priority levels were set by power-up reset and that external hardware interrupts are edge-triggered. [CO3, PO 1,2,3,5 BL3] | (2) |
| | A) | | |
| | B) | Asses the use of timer 0 of 8051 microcontroller in mode 1 to generate a pulse width of 5ms on pin P2.3. Assume XTAL=11.0592MHz. [CO3, PO 1,2,3,12 BL3] | (3) |
| | C) | Explain the GPIO registers associated with LPC2148. A proximity sensor placed in an entrance is connected to P2.3 of LPC2148 to monitor the entry of people. Write the C code statements to monitor the changes in the sensor output to increment a count value for every changes and send it to port0 to which a display device is connected. [CO4, PO 1,2,3,4,12 BL4] | (5) |
| 4) | | Explain the rules for single edge controlled PWM outputs. [CO4, PO 1,2,3,4,12 BL2] | (2) |
| | A) | | |
| | B) | Justify the contribution of each bit in SCON register to serial communication using 8051 microcontrollers. [CO3, PO 1,2,3,12 BL3] | (3) |
| | C) | Illustrate the pre indexed and post indexed addressing for Load/store instructions in ARM | (5) |

processors. [CO4, PO 1,2,3,4,12 BL3]

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| 5) | | With suitable example demonstrate the use of registers to set the resolution of LPC2148 timer. [CO4, PO 1,2,3,4,12 BL3] | (2) |
| | A) | | |
| | B) | Demonstrate the use of different bits of current program status register for monitoring and controlling the operations of ARM processors. [CO4, PO 1,2,3,4,12 BL3] | (3) |
| | C) | Draw and explain the programmers model of ARM processor. Write an ALP for ARM to store the values 0x05, 0x06 and 0x07 in the memory location starting from 0x300 using base plus offset addressing mode. [CO4, PO 1,2,3,4,12 BL4] | (5) |

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