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| --- | --- | --- | --- | --- |
| **Question** | **Q1** |  | **Name** |  |
| **Your score** |  |  | **Student ID** |  |
| **Full score** | **20** |  |  |  |

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| EE3046 Microcomputers Theory and Laboratory, 2022 Spring Semester  **Final Exam (8051)** *Scope*: CPU design*Time*: 18:00~20:50 |

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Best viewing mode for this question sheet in Microsoft Word program | |  |  | | --- | --- | | English version: | 中文版 | |  |  | |      |  |  | | --- | --- | | File download | 9876543210陳小美Q1.circ, myLib, TP01.asm  2022Spring-FinalExam – Q1.docx  Note: The code ROM and instructionDecoding ROM in 『9876543210陳小美Q1.circ』are ready to run TP01.asm. The uPM is also ready, except that the microinstruction of 『JZ offset』needs to be filled by you. | | Answer upload | Fill in the answer sheet online. | |

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| Q1. (20%) Microinstruction design for 『JZ offset』 |

The file 『**9876543210 陳小美 Q1.circ**』is the final design of the CPU Design part of our EE3046 course.

Please design the microinstruction for 『JZ offset』 to be run in this circuit。.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Bit no. (Hex) | 1F | 1E | 1D | 1C | 1B | 1A | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 0F | 0E | 0D | 0C | | 0B | 0A | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |  |  |  |  |  |  |
|  |  |  | Sel\_ opcode or operand | | Flag value for disabling offset | sel PC in (= instru. Length) | | | Sel of flag | | | En of μPC counting | Sel\_ RAM addr | | Sel\_ RAM Din | |  | En\_ RAM Addr Lat | En\_ RAM Dout Lat | Str RAM | |  |  | Sel\_ ALU Bin | | Sel\_ ALU | | | |  |  | En of Cy update | En\_ Acc update | μP code in hexa-decimal | Assembly | Machine code | Length | Cycles  (Ours) | Cycles  (Official) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 | - | - | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | ？ | - | ？ | ？ | ？ | | - | - | ？ | ？ | ？ | ？ | ？ | ？ | - | - | ？ | ？ | ???????? | JZ offset  (Official 8051 needs 2 cycle.) | 01100000 offset | 2 | 1 | 2 |
| Please enter your answer to the following places. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 48 |  |  | U01 | | U02 | U03 | | | U04 | | | U05 | U06 | | U07 | |  | U08 | U09 | | U10 |  |  | U11 | | U12 | | | |  |  | U13 | U14 |  |  |  |  |  |  |

**Test program：**

You can verify the functionality of the microinstruction that you have designed by running the test program TP01.asm in “9876543210陳小美Q1.circ”.

The ROMs in this circuit are filled with necessary data except the microinstruction of 『JZ offset』. So, you have to fill in it to μPM at 48H.