EECE.3170: Microprocessor Systems Design I<br>Fall 2016<br>Lecture 10: Key Questions<br>September 26, 2016

1. Explain the operation of the rotate instructions (ROL, ROR, RCL, RCR).
2. Example: Given $\mathrm{AL}=0 \times 43, \mathrm{CL}=0 \times 04$, and $\mathrm{CF}=0$, show the state of AL after each instruction in the sequence below:

ROR AL, 2
ROL AL, CL
RCR AL, 3
RCL AL, 4
3. Explain the operation of the bit test instructions (BT, BTR, BTS, BTC)
4. Explain the operation of the bit scan instructions (BSF, BSR).
5. Example: Given the following initial state, list all changed registers and/or memory locations and their new values. Where appropriate, you should also list the state of the carry flag (CF).

Initial state:
EAX: 0x00000000
EBX: 0x0000000A
ECX: 0x00000000
EDX: 0x00000000
CF: 0
ESI: 0x00000008
EDI: 0xFFFF0000

## Address

| 0x21100 | 04 | 00 | 10 | 10 |
| :---: | :---: | :---: | :---: | :---: |
| $0 \times 21104$ | 89 | 01 | 20 | 40 |
| $0 \times 21108$ | 02 | 00 | 00 | 16 |
| $0 \times 2110 \mathrm{C}$ | 17 | 03 | FF | 00 |
| $0 \times 21110$ | 1E | 00 | 06 | 00 |
| $0 \times 21114$ | 08 | 00 | 0A | 00 |

## Instructions:

| BT | WORD PTR $[0 \times 21102], 4$ |
| :--- | :--- |
| BTC | WORD PTR $[0 \times 21110], 1$ |
| BTS | WORD PTR $[0 \times 21104], 1$ |
| BSF | CX, WORD PTR [0x2110E] |
| BSR | DX, WORD PTR [0x21109] |

