**Electronics and Communication Engineering Department**
**NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA-8**
**Mid-Semester (Autumn) Examination, Sept – 2011**

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| Course Code: EC 301 | B Tech ($5^{th}$ EC) |
| Course Name: Microprocessor | |
| Full Marks: 30 | Duration of Examination: 2 hours |
| Answer as many questions as possible.<br>Marks secured above 30 will be rounded to 30.<br>Each question carry 3 marks (unless specified differently) | |

1. Draw the register organization of Intel 8086 microprocessor. Show how these have been extended for i80386 processor?

2. What are the functions of flags in a microprocessor? List the flag architecture of 8086/ 8088 processor. List the instructions that can read flags or write to flags. Describe any one of these instructions with an example.

3. How does maximum mode and minimum mode operation of 8088 differ? Analyze the process of generation of control signals.

4. Discuss the mechanism to generate clock signal for 8086/ 8088 processor.

5. An 8088 processor operates with 8MHz clock. It is used to fetch a byte of data from memory which requires 280ns to deliver the data to the data bus. Determine the number of wait states necessary to complete the task.

6. 8086 processor needs less time access a word from even address than from odd address. Justify.

7. Discuss the working of indexed addressing mode in 8086 family of processors. Identify the addressing modes used in each of the following instructions
    a. MOV [BX]+0100H, AX
    b. MOV CX, 1234H

8. 8086 and 8088 processors have 16bit registers. How are these used to generate 20bit address? If the current CS is 2400H determine range of physical addresses from where instructions can be fetched.

9. Current states of 8088 registers and memory are as under:
   (AX) = 2200H; (BX) = 0010H; (CX) = 0205H; (DX) = 2222H; (DI) = 0200H; (CF) = 1
   (DS:200H)=33H
   Determine the content of the destination operand after execution of following instructions:
    a. ROR DX, CL
    b. ROL BYTE PTR [DI], 3
    c. ADD AX, DX

   Discuss the operation of instructions and condition of flags after each of these instructions.

10. Discuss the working of PUSH and POP instructions.

11. Draw the signal diagram for 8086 IO read cycle. Following signals are to be drawn: address lines, data lines, status lines, M/$\overline{IO}$, ALE, $\overline{DEN}$ and DT/R signals.

12. It is proposed to interface 128MB of RAM to 8086 processor operating in minimum mode. The memory is available in 8 chips of equal size. Show a scheme to connect the chips to the processor. Show the process of connecting address lines, data lines, chip select, $\overline{BHE}$, ALE, $\overline{RD}$ and $\overline{WR}$ signals. **(6marks)**

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