BITS, PILANI – DUBAI CAMPUS
KNOWLEDGE VILLAGE, DUBAI
II Year Second Semester 2005 – 2006
MICROPROCESSORS PROGRAMMING & INTERFACING ES UC 263

Comprehensive Examination

Time : 3 hours **Weightage : 40%**
16.05.06 **MAX : 40 MARKS**

Note:

1. This question paper has **two** parts **PART A** and **PART B.**
2. Answer **PART A in the main answer book** and **PART B** in the **additional booklet** provided.
3. Answer all questions in **each section** sequentially.
4. **No calculators** are to be used.

PART - A

1. Draw the conceptual view of 80486 microprocessor. 1M
2. The 8086 microprocessor addresses _____ bytes of memory. 1M
3. Which register or registers are used as an offset address for string instruction destinations in the microprocessor? 1M
4. Find the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following CS:IP combinations. CS = 3456H and IP = ABCDH 1M
5. Determine the memory location addressed by the following real mode register combination. SS = 2300H and BP = 3200H 1M
6. Select an instruction to perform the task of copying AL into extra segment memory location 3000H. 1M
7. Suppose that DS = 1100H, BX = 0200H, LIST = 0250H and SI = 0500H. Determine the address accessed by the following instruction, assuming real mode operation. MOV CL, LIST [BX+SI] 1M
8. What, if anything, is wrong with a MOV AL, [BX][SI] instruction? 1M
9. What is the difference between an LEA SI, NUMB instruction and a MOV SI, OFFSET NUMB instruction? 1M
10. Explain the operation of the LODSB instruction. 1M
11. Describe the purpose of EQU directive. 1M
12. Write a procedure that sums DATA and DATA+1. Store the result in BL register. 1M
13. IF DL= 0F3H and BH = 72H, list the difference after BH subtract from DL, and show the contents of the flag register bits. 1M
14. a. Distinguish between macro and procedure. 1M
    b. Distinguish between DOS function call and BIOS video function call. 1M
    c. Compare near jump and far jump with examples. 2M
15. Write a procedure that multiplies DI by SI and then divides the result by 100H. Make sure that the result is left in AX upon returning from the procedure. This procedure may not change any register except AX 3M

PART - B

16. Fill in the blanks
    a. DMA stands for _____
    b. The DMA controller has _____ channels
    c. The 8259 has two types of control words the _____ _____.
    d. The _____ can be used to increase the number of interrupt signals in the 8259.
    e. The Programmable Interval Timer can work in _____ modes
    f. If the MSB of the control word of the Programmable Peripheral Interface is set to 0 than the 8255 works in the _____
    g. An interrupt pulse is acknowledged by a _____
    h. The _____ pin in the 8086 supports DMA operations
    i. One wait state introduces a delay of _____ ns. (0.5 X 10 = 5M)

17. List the advantages and disadvantages of using Isolated I/O ? 2M
18. What is meant by handshaking with reference to interfacing ? 1M
19. Show how the multiplexed Address and Data lines in an 8086 are de-multiplexed using three 74LS373 latches 3M
20. Show the timing diagram for the read operation over one bus cycle. 2M
21. Show the interfacing for eight 64K X 8 memory, the address range selected is 40000H to 4FFFFH.Make use of a 3-8 decoder. 3M
22. Explain the function of buffers and latches in interfacing. 1M
23. A wait state is introduced between the 3rd and 4th clock periods. Is the statement true or false. 0.5M
24. Give any three details stored in the root directory. 1.5M
25. Mention the different modes in which port A can work in the 8255. 1M

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Test 2(Open book)

Duration : 50 Mins Max marks : 20 Weightage : 20% Date : 14-05-06

Answer all questions in sequential order, questions attempted out of sequence will not be evaluated

1. Show the interfacing diagram for interfacing eight, 2732 EPROM chips by making use of a 74LS138, 3 to 8 decoder. The memory map required is 0000H to 8000H.The 2732 EPROM is a 4096X8 chip. 3M
2. Differentiate between the MIN and MAX mode of operation of the 8086. 1M
3. Differentiate between the signals CS and OE in a memory device. 1M
4. Explain the need for "DEMULTIPLEXING" in 8086. 1M
5. The 8284 is used to generate _____ and _____ 1M
6. Give the difference in the operation of the 74LS245 and the 74LS244 1M
7. The two operations that occur during a bus cycle are _____ and _____. 1M
8. Write a single logical instruction for each of the following operation. Note that no other changes should occur. (3 * 1 = 3 M)
   a. Change the sign of the content of BX
   b. Multiply the content of AX by 16
   c. Test bit no. 5 in DX
9. Contrast the operation of a JMP DI with a JMP [DI]. 1M
10. Identify the error in the code. 1M

```
CUBE   PROC NEAR USES AX DX
       MOV  AX,CX
       MUL  CX
       MUL  CX
       RET
CUBE   END
```

11. Identify the error in macro definition 1M

```
MACRO  A,B
       PUSH AX
       MOV  AX, B
       MOV A, AX
       POP AX
       ENDM
```

12. For the instruction CALL 095F, the value of CS is 1000, find the address where procedure will point to? 1M
13. Why procedure executes slower than macros? 1M
14. _____ function call provides a method of reading from the keyboard . 1M
15. Use BIOS INT 10H to develop a procedure that positions the cursor at line3, column 6. 2M

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Test 1(Closed book)
Duration : 50 Mins Max marks : 15 Weightage : 15%

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MAKE-UP

1. Give the significance of the direction flag with respect to string operations and with respect to instruction encoding. 1M
2. Differentiate between the working of the SUB and the CMP instruction
3. Explain each of the following instructions
   a) PUSHF
   b) OUTSB
   c) DAS 1X3=3M

4. Give the machine code format for the following instructions
   a) MOV CX, [437AH]
   b) MOV SP, BX 1X2=2M
   The codes for the register CX is 001, SP is 100, BX is 011

5. Write a program code to show 16 bit signed division 1M
6. Which control signal causes the memory to perform a read operation?
7. When 7FH is added with 01H, what will be the effect in overflow flag?
8. Find the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following CS:IP combination where CS = 356H and IP = ABCDH.
9. Write a program to define DATA1 as a byte of 100H and DATA2 as a word of 1250H and move to registers AL and BX respectively.
10. Represent in diagrammatic form the contents of registers and memory for the instruction MOV AX,[BX]] where BX = 1000H, DS = 0100H, AH= 34 and AL = 12.
11. In the instruction MOV[DI],10H, assembler cannot determine the size of 10H, How will you modify the instruction so that it is unambiguous?
12. What are the three program memory addressing modes?

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Microprocessors Programming & Interfacing ES UC263
Test 1(Closed book)

Duration : 50 Mins Max marks : 15 Weightage : 15% Date : 26-03-06

Answer all questions in sequential order, questions attempted out of sequence will not be evaluated. Calculator is not allowed

1. Fill in the blanks
   a) The remainder of 8 bit division is found in the _____
   b) When 8 bit numbers are divided, the dividend is found in the _____.
   c) Product of MUL EDI is found in _____
   d) For string instructions, DI always addresses data in the _____ segment.
   e) In ASCII numbers _____ is used to adjust the number before division.
   f) CDQ stands for _____. **0.5 X 6 = 3M**
2. Give errors in the following code if any
   a) CNTDWN: MOV BL, 72H
   DEC BL
   JNZ CNTDWN
   b) ADD CX, AL
   c) JMP [BX]
   d) IMUL [BX] **0.5 X 4 = 2M**
3. Write a complete program to convert Fahrenheit temperature to Celsius. The relationship between Fahrenheit and Celsius is
   $C = (F - 32) X 5 / 9$ **2M**
4. Write a sequence of instructions that cube an 8 bit number found in DL. Load DL with 7 initially. The result should be a 16 bit integer. **1M**
5. If the MWTC signal is a logic 0, which operation is performed by the microprocessor? **1M**
6. The memory location addressed by the registers SS and SP in real mode is 2CA00H. If SS = 2900H. Find the value of SP. **1M**
7. In the real mode, if the ending address of segment is 2233FH, then find the content of segment register. **1M**
8. Write a program to push the contents of AX and BX onto stack, where AX = 150H and BX = 400H. Perform pop operation so that the first pop value is placed into CX and the next pop places the value in BX. **1M**
9. Write a program to copy the contents of AX and BX into SI and DI where AX = 125H and BX = 210H. **1M**
10. Write a program to move array element 15H into array element 25H where the array element is loaded into DI register and the contents of ARRAY have been initialized so that array element 15H contains a 250H. **1M**
11. What is the difference between inter segment jump and intra segment jump? **1M**

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Test 1(Closed book)

Duration : 50 Mins Max marks : 15 Weightage : 15%

Answer all questions in sequential order, questions attempted out of sequence will not be evaluated

MAKE-UP

1. Give the significance of the direction flag with respect to string operations and with respect to instruction encoding. 1M
2. Differentiate between the working of the SUB and the CMP instruction
3. Explain each of the following instructions
   a) PUSHF
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9. Write a program to define DATA1 as a byte of 100H and DATA2 as a word of 1250H and move to registers AL and BX respectively. 1M

10. Represent in diagrammatic form the contents of registers and memory for the instruction MOV AX,[BX]] where BX = 1000H, DS = 0100H, AH= 34 and AL = 12. 1M

11. In the instruction MOV[DI],10H, assembler cannot determine the size of 10H, How will you modify the instruction so that it is unambiguous? 1M

12. What are the three program memory addressing modes? 1M

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Quiz(Closed book)

Duration : 30 Mins Max marks : 10 Weightage : 10% Date : 08-03-06

VERSION A

Note : Mark only one answer **clearly** on the question paper itself. Answers not marked clearly **will not be evaluated.**
All questions carry equal marks (1/2)

Name :

Id:

Request for Recheck:

1. _____ is the full form of MIPS.

2. If 3100H is the content of segment register, then the ending address is _____.

3. Suppose that DS = 1300H, SS = 1400H, BP = 1500H and SI = 0250H.
_____ is the address accessed by the instruction.
MOV AL, [BP+ SI-200H]

4._____ instruction copies the double word contents of the data segment memory location addressed by the sum of ARRAY plus 4 times ECX into EAX.

5. Register relative addressing uses either _____ or _____ register plus a displacement to access array data.

6. _____ instruction is and example for Relative Program Memory addressing.

7. _____ instruction moves EAX into the data segment memory location addressed by the sum of ARRAY and EBX.

8. _____ is the instruction for the task to copy 1200A2H into EBX.

9. Suppose that DS = 1200H, BX = 0100H, LIST = 0200H and SI = 0250H.
_____ is the address accessed by the instruction.
MOV DL, LIST[BX + SI]

10. The 16 bit PUSH instruction decrements _____ register by 2.

11. What is the correct definition of the term 'instruction set'?
a) The range of opcodes which a CPU is programmed to recognize
b) The list of instructions in memory which forms the program being executed
c) A specific subroutine of a program, run if conditions relating to the flag register are satisfied
d) The process by which a single instruction of a program is executed

12. Where does the control unit look in order to find the address of the next instruction to be fetched?
a) Memory Address Register (MAR)
b) Instruction Register (IR)
c) Memory Buffer Register (MBR)
d) Accumulator (ACC)

13. Which of the following is NOT one of the three stages of the instruction execution cycle?
a) Decode
b) Fetch
c) Flag
d) Execute

14. The Program Counter register is used for:
a) Holding the address of the memory location that is to be next processed
b) Counting the amount of total memory being used by the program
c) Holding the result of operations performed by the ALU
d) Counting the number of programs run during one use of the computer

15. Which of these four does NOT comprise a part of the system bus?
a) Data bus
b) Logic bus
c) Control bus
d) Address bus

16. The arithmetic and logic unit is used to:
a) Control the operation of the rest of the CPU
b) Determine whether a program is able to be executed
c) Carry out basic operations on integers and booleans
d) Transfer information to the memory

17. The width of the address bus determines:
a) The speed at which information is dealt with
b) The amount of instructions the CPU can deal with at one time
c) The distance information can be transported in the computer without degrading
d) The maximum addressing capacity

18. What is the correct definition of the term 'CISC'?

19. The Pentium II has two cache of size ---------- and
_____

20. If the value of the flag register is NV UP EI PL NZ NA PO NC than the meaning of the following flags are

NZ –

NA -