

BITS, PILANI – DUBAI
International Academic City, Dubai
Year II – Semester II 2008– 2009

Course No.: ES C263 COMPREHENSIVE EXAM (Closed Book)

Course Title: Microprocessor Programming and Interfacing

Date: May 20, 2009 Time: 3 Hours Max. Marks = 40 Weightage : 40%

- Instructions**
1. Calculator not allowed
 2. This paper contains 3 sections answer each section in a separate booklet provided.
 3. Answer all questions of a section sequentially.

PART A

1. Convert the following decimal numbers to packed BCD.
 - a) 86
 - b) 62[2 marks]

2. Express the following decimal numbers in 8 bit sign and magnitude form.
 - a) +26
 - b) -125[1 mark]

3. Perform the operation $3AH + 94H$ and verify your answer in decimal .
[2 marks]

4. Write the hexadecimal representation for the following instructions.
 - a) MOV CL, [BX]
 - b) MOV CX, [437AH]Given that the code for registers CL/CX is 001, BX is 011
[2X2=4 marks]

5. Write a program to add an array of 5 words containing the data element 3 in all the locations using
 - a) Register relative addressing
 - b) Base plus Index addressing[3 marks]

PART B

1. Assuming that register BX contains 003A₁₆, what is the result of executing the following instruction?
NEG BX [1 mark]
2. What is the result of executing the following sequence of instructions.
MOV AL,0A1H
CBW [1 mark]
3. Write instructions that show two different ways of incrementing the address pointer in SI by two. [1 mark]
4. If the original contents of AX, CL and CF are 800FH, 04H and 1 respectively, What is the content of AX and CF after executing the instruction that follows:
SAR AX, CL [1 mark]
5. Develop a sequence of instructions that sets (1) the rightmost four bits of AX, clears (0) the leftmost three bits of AX and inverts bits 7,8, and 9 of AX. [1 mark]
6. Find the address that is stored at beginning of memory location in protected mode when the following instruction calls the interrupt service procedure.
INT 17H [1 mark]
7. Identify the type of jump, the type of operand and operation performed by the following instruction.
JNP 1000H [1 mark]
8. What is saved on the stack when a call instruction with a memptr16 operand is executed? [1 mark]
9. Write an assembly program to read a string of 8 characters on screen at(x1,y1) and display the same at (x2,y2) using BIOS interrupts. [3 marks]
10. Expand the code for the macro given below: [2 marks]

```
MyMacro    MACRO    p1,p2,p3
            MOV AX, p1
            MOV BX, p2
            MOV CX, p3
ENDM

MyMacro    1, 2, 3
MyMacro    4, 5, DX
RET
```

PART C

1. An odd number I/O port addresses are found in the ----- I/O bank in the 8086 microprocessor. [1 mark]
2. How many 74LS138's are needed to partition the memory address space of 64KB into a) eight contiguous blocks each of size 8K bytes? b) 16 contiguous blocks each of size 4K bytes? [1 mark]
3. Describe memory mapped I/O and direct I/O. Give the advantage and disadvantage of each. [1 mark]
4. At what point in a machine cycle, does an 8086 enter a wait state? Which are the pins responsible for that in 8086? [2 marks]
5. Draw the simplified diagram of write and read bus cycle of 8086 and show the difference between them with respect to address/data line. [1 mark]
6. Use a 74LS138 decoder to design a circuit that uses eight 2764 EPROMS for a 64K*8 section of memory in an 8086 microprocessor based system to select address in the range B0000 H-BFFFF H. write the address range of the EPROM connected to output 3 of the decoder. [4 marks]
7. What is direct memory access? Explain the process called switching from the slave mode to master mode. And what are the signals associated with that in 8086. [2 marks]
8. Draw the pin out and truth table of the 74LS139, dual 2-to-4 line decoder. [2 marks]
9. Expand RMM, EEPROM, EAPOM and NOVRAM [1 mark]

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Year II – Semester II 2008– 2009

Course No.: ES C263 TEST II (Open Book) Course Title: Microprocessor

Programming and Interfacing

Date: April 30, 2009 Time: 50 Minutes Max. Marks = 15

- Instructions**
1. Calculator not allowed
 2. This paper contains 3 sections answer all questions of a section together.
 3. Only prescribed text book and handwritten class notes are permitted.

PART A

1. Use the 8086 string instructions, to write a program which takes a password as input from the user and if the password is correct put 50H in AL, otherwise put 80H in AL and the correct password is "MICROTEST". (2 marks)
2. Write a program sequence that selectively sets bits 0 and 2 of DL, changes bit 1 and 6, clears 3 and 4 and then tests 1 and 7 and branches to exit if they both are set. (2 marks)

PART B

1. Write an assembly program to find the factorial of a given number using macro. (1 mark)
2. Identify the error in the following code. (1 mark)

```
DISP PROC
      MOV AH,2
      INT 21H
DISP ENDP
```
3. If CS = 2000 and IP = 000A and the instruction is JMP 3C. Find the next address location. (1 mark)
4. Write a program to read a string from the user and to display the string at position (25,25) on the monitor. (2 marks)

P.T.O

PART C

1. A 74LS138 decoder has its three select inputs A,B,C connected to A12, A13 and A14 respectively of the system address bus. It has $\overline{G2A}$ connected to A15, $\overline{G2B}$ connected to \overline{RD} and G1 connected to +5V. Assume lines A16 – A19 are not used. a) Represent the above connections in a figure and clearly show how the address is calculated for each of the eight ROM blocks.
b) Why is \overline{RD} used as one of the enables on the ROM decoder ? (1 + 2 + 1 marks)
2. A memory device has 15 address lines connected to it and 8 data outputs. a)What is the size of the memory ? b) What is the size of the data stored in each memory location ? c) What is the total size of the data stored in the memory ? 1 mark
3. What logic levels would you find on \overline{BHE} and A0 when 8086 is writing
a) a byte to address 04274H
b) a word to address 04373H 1 mark

BITS, PILANI – DUBAI

International Academic City, Dubai

Year II – Semester II 2008– 2009

Course No.: ES C263 TEST I (Closed Book) Course Title: Microprocessor

Programming and Interfacing

Date: March 22, 2009

Time: 50 Minutes

Max. Marks = 20

- Instructions**
1. Calculator not allowed
 2. Answer all questions of a section together

Section A

1. If there are 32 address lines and 16 data lines, what is the memory address space assuming that the memory and I/O address spaces are separate? [1 mark]
2. Convert the following hexadecimal numbers into decimal.

a) FAB.3
b) BB8.0D [3 mark]
3. Determine the memory location addressed by the following real mode Pentium 4 register combination
DS: CA10 H and ESI=0010 FFF8 H [1 mark]
4. In real mode, show the starting and ending address of the code segment when CS = AB00 H [1 mark]
5. Write a procedure that sums two 64 bit numbers stored in EBX-EAX and EDX-ECX [1 mark]
6. CMP [DI], [BP] is it a legal instruction and why? [1 mark]

Section B

1. Write an instruction that copies a byte from the data segment memory location addressed by DL onto the stack. [1 mark]
2. Write an instruction that copies the contents of AX register into the code segment register. Is the instruction valid? Justify your answer. [1 mark]
3. 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] [1 mark]
4. Write an assembly program to swap two values stored in a stack. [1 mark]
5. Write a program to find the sum of odd numbers of an array of size 5 elements. [2 marks]

Section C

1. Write an assembly language program to move a string 'HELLO' from DS:1734 to ES: 7396 using LODSB and STOSB instructions. The string at the destination is to be such that each character appears twice at the destination. For e.g. in the ES the string is to be displayed as HHEELLLLOO. [2 marks]
2. Give the hexadecimal representation for the given instructions in the 16 bit instruction mode. [2 X 2 marks]
 - a. MOV DS, SP
 - b. MOV WORD PTR[ECX + EBX * 2], EDXGive the significance of each bit clearly.

The bit assignments of the registers are specified below

DS : 011
SP : 100
ECX : 001
EBX : 011
EDX : 010

***** ALL THE BEST *****

~~11/10/2008~~

Sec. 5

BITS, Filani - Dubai
International Academic City, Dubai
II- Semester 2008-2009

Course Number : ES C263
Course Name : Microprocessor Programming and Interfacing
Nature of Component : Quiz 1 – Closed book
Weightage : 5 %
Max. Marks : 5 Marks
Duration : 15 minutes.
Date of Examination : 23.02.2009

Name : _____

ID No. _____

1. If 3100H is the content of segment register, then the starting and ending addresses are _____ and _____.

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

3. Convert the decimal number 1238 to BCH (Binary Coded Hexadecimal).

4. Find the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following combination: SS = 8000H and ESP = 00009000H.

5. _____ instruction copies the word contents of the data segment memory location addressed by DI plus 100H into A register.

Su S
quiz 2

BITS, Pilani - Dubai
International Academic City, Dubai
II- Semester 2008-2009

Course Number	:	ES C263
Course Name	:	Microprocessor Programming and Interfacing
Nature of Component	:	Quiz 2 – Closed book
Section	:	5
Weightage	:	5 %
Max. Marks	:	5 Marks
Duration	:	15 minutes.
Date of Examination	:	30.03.2009

Name : _____ **ID No.** _____

1. Write a sequence of instructions that cube the 8-bit number found in DL. Load DL with a 5 initially, and make sure that the result is a 16-bit number. Do not use multiplication instruction. (2 marks)

2. Write an instruction to move the offset of ARRAY into SI register without using MOV instruction. (1 mark)

3. Write a sequence of instructions to add the numbers FACE and CAB stored in DX and BX registers in BCD. (2 marks)

Sec. 5
quiz-3

BITS, Pilani - Dubai
International Academic City, Dubai
II- Semester 2008-2009

Course Number : ES C263
Course Name : Microprocessor Programming and Interfacing
Nature of Component : Quiz 3 – Closed book
Section : 5
Weightage : 5 %
Max. Marks : 5 Marks
Duration : 15 minutes.
Date of Examination : 22.04.2009

Name : _____

ID No. _____

1. Write a program to display the string "BITS" on the monitor screen using procedure DISPLAY. (2 marks)

2. Which type of JMP instruction assembles for the following :
If the distance is 0210H bytes. (1 mark)

3. Develop a macro called ADD32 that adds the 32 bit contents of DX-CX to the 32 bit contents of BX-AX. (2 marks)

QUIZ - 3

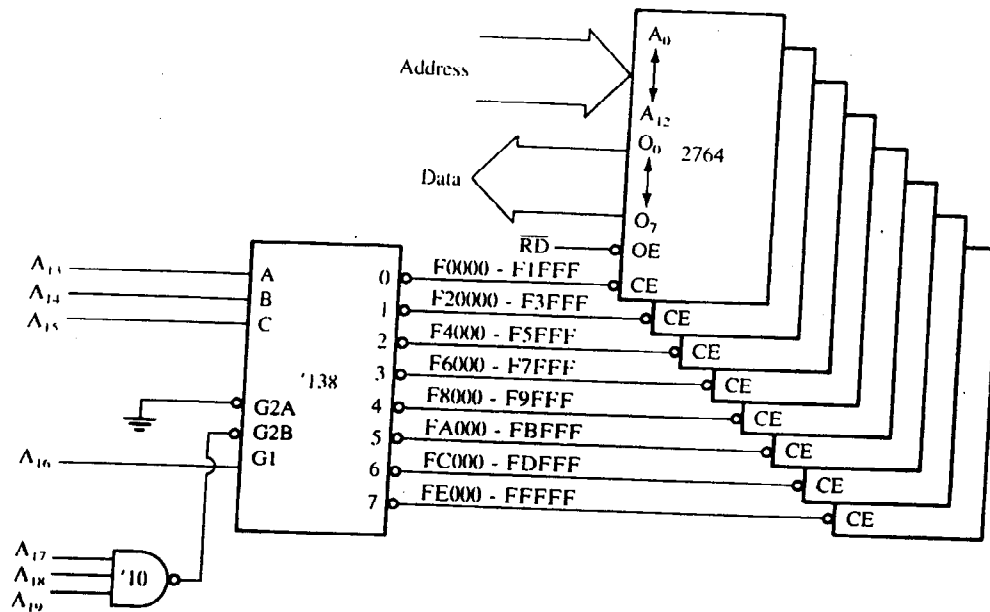
Date: 24/3/09

Microprocessor Programming and Interfacing ESC263

Max Marks: 5 Weightage : 5% II Year Section 4

Name : _____ ID No : _____

1. Modify the circuit shown in the figure to address memory range 70000H-7FFFFH.



QUIZ - 2

Date: 24/3/09

Microprocessor Programming and Interfacing ESC263

Max Marks: 5 Weightage : 5% II Year Section 4

Name : _____ ID No : _____

1. Develop a sequence of instructions that [3 marks]
 - a) sets the rightmost four bits of AX
 - b) clears the leftmost 3 bits of AX
 - c) inverts bits 7,8 and 9 of AX
2. Where is the remainder found after an 8-bit division?[1 mark]
3. What errors are detected during a division? [1 mark]

QUIZ – 1

Date : 24/3/09
Max Marks : 5

Microprocessor Programming and Interfacing ESC263
Weightage : 5% II Year Section 4

Name : _____ ID No : _____

- a. Convert each of the given Hexadecimal number to its binary and decimal equivalents i) 9A26 ii) 7BF52A [1M]
- b. The Pentium 4 micro processor addresses ----- bytes of memory [1M]
- c. Show which JMP instruction assembles (short, near or far) if the JMP THERE instruction is stored at memory address 10000H and the address of THERE is
1. 10020 H ii) 11000 H [1M]
- d. Suppose FILE A contains Records X, Y and Z. Each record contain 10 elements , write a assembly language program to move elements 1,3,5 of record X to element 2,4,6 of record Y respectively. [2 M]

QUIZ – 1

Date : 24/3/09
Max Marks : 5

Microprocessor Programming and Interfacing ESC263
Weightage : 5% II Year Section 3

Name : _____ ID No : _____

1. If there are 20 address lines and 16 data lines, what is the memory address space assuming that the memory and I/O address spaces are separate? [1 M]
2. If the physical branch address is 5A230 when (CS) = 5200, what will it be if the (CS) is changed to 7800? [1 M]
3. Give the sum and the flag settings for AF, SF, CF, OF and PF after hexadecimally adding 62A0 to 1234. [1 M]
4. Given that BX= 637D SI= 2A9B Displacement = C237 and DS=490B
Determine the effective address resulting from these registers for Base
Relative plus index registering. [2 M]

QUIZ – 2

Date: 25/3/09

Microprocessor Programming and Interfacing ESC263

Max Marks: 5 Weightage : 5% II Year Section 3

Name : _____ ID No : _____

1. Write a sequence of instructions to multiply a no by 34 without using MUL instruction. [2 marks]
2. write few lines of code to check the bit in position 8 in BX register and if it is 1 jump to location LOC1 and if it is 0 jump to LOC2.
3. write a instruction to invert the bits 0,5,6,8,10 in CX register.

QUIZ – 3

Date: 5/5/09

Microprocessor Programming and Interfacing ESC263

Max Marks: 5 Weightage : 5% II Year Section 3

Name : _____ ID No : _____

1. The 8284 is used to generate ----- and --
-----.
[1 M]
2. Write the advantage and disadvantage of the procedure and
macro.
[2 M]
3. What are the ICs used in fully buffered 8086 microprocessor
and also mention the number of ICs used. [1M]
4. What is the actual memory access time, if the clock is
operated in the basic operating frequency of 5MHz and
explain how, we are arriving at that? [1 M]

BITS, PILANI – DUBAI
International Academic City, Dubai
Year II – Semester II 2008– 2009

**Course No.: ES C263 Quiz III (Closed Book) Course Title: Microprocessor
Programming and Interfacing**

Date: May 5, 2009 Max. Marks = 5 IInd Year Section 2

Name : _____

ID No : _____

1. Interface a 16K X 8 EPROM to a 8086 microprocessor , use a 256K X 8 PROM for address decoding. Show the PROM programming pattern and calculate the address range of each memory block. 4M

2. Write a program to read two strings into two buffers buf1 and buf2 using DOS interrupts , compare if these two strings are the same, if not display the message UNEQUAL at the centre of the screen. 3M

3. Draw the timing diagram for write to a memory device, the signals to be shown are AD, ALE, Ready, DT/R(overbar), WR (overbar). 3M

BITS, PILANI – DUBAI
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Year II – Semester II 2008– 2009

**Course No.: ES C263 Quiz II (Closed Book) Course Title: Microprocessor
Programming and Interfacing**

Date: March 24, 2009 Max. Marks = 10 Weightage= 5% IInd Year Section II

SET A

Name : _____

ID No : _____

1. Write a program to multiply the number 4 which is stored as a byte by 20. Store the product in a variable prod. Use a logical operator to perform the multiplication. 3M
2. Given the instruction MOV AX,9 give the logical instruction needed to convert this data to 06, show the working of the instruction. 2M
3. Write a program to add two decimal numbers A and B and to multiply their product by 10. Use an arithmetic instruction to perform multiplication. 3M
4. Write the instructions to store -17 in register BX and to find the 2's complement

BITS, PILANI – DUBAI
International Academic City, Dubai
Year II – Semester II 2008– 2009

**Course No.: ES C263 Quiz III (Closed Book) Course Title: Microprocessor
Programming and Interfacing**

Date: May 4, 2009 Max. Marks = 5 IInd Year Section 1

Name : _____

ID No : _____

1. Interface a 32K X 8 EPROM to a 8086 microprocessor , use a 1K X 8 PROM for address decoding. Show the PROM programming pattern and calculate the address range of each memory block. 4M

2. Write a program to read two strings into two buffers buf1 and buf2, compare if these two strings are the same, if yes display the message EQUAL. 3M

3. Draw the timing diagram for write to a IO device, the signals to be shown are AD, ALE, Ready, DT/R(overbar), WR (overbar). 3M

BITS, PILANI – DUBAI
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Year II – Semester II 2008– 2009

**Course No.: ES C263 Quiz II (Closed Book) Course Title: Microprocessor
Programming and Interfacing**

Date: March 30, 2009 Max. Marks = 5 IInd Year Section 1

Name : _____

ID No : _____

1. Write a program to generate numbers 3, 6, 9, 12, 15, 18.....60 . Check if the number is divisible by 5. All numbers divisible by 5 are stored in a table DIV5.
3M

2. WAP to check if the value AAFFH occurs in an array of size 50 words. 2M

3. Given the instructions

```
MOV AL, 17
MOV CL,3
RCR AL,CL
SHL AL,1
```

Clearly show the working of these instructions. 3M

4. Give instructions to

- a) change 00 to FFH
- b) change 0F to FFH

2M

BITS, PILANI – DUBAI
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Course No.: ES C263 Quiz I (Closed Book) Course Title: Microprocessor programming and Interfacing

Date: March 02, 2009 Max. Marks = 5 IInd Year Section 1

Name : _____

ID No : _____

1. Give the operation code for the given instructions.
 - a. MOV ESI,EDI
 - b. MOV [SI + F379H], CX

Clearly give the significance of each bit in the operation code. The bit values for the registers are as specified ESI : 110 EDI : 111 CX : 001 [SI] : 100. Also specify the number of bytes involved in each instruction.

2. Write an assembly language program to reverse the contents of an array of size 20 words, use a stack to perform the reverse operation.
3. Perform the operation $46 - 73$ using binary words, justify your answer. Clearly show the status of the Z, C, S, O flag bits after the execution of the instruction.