CBCS SCHEME

USN | | | | | | | | | | |

15CS44

Fourth Semester B.E. Degree Examination, June/July 2018
Microprocessors and Microcontrollers

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. What is a microprocessor? With a neat diagram explain the internal block diagram of 8086 microprocessor along with functions of each block and registers. **(10 Marks)**

b. What is an addressing mode? List the addressing modes of 8086 μp with one example each (any six modes). **(06 Marks)**

OR

2 a. What are the assembler directives? Explain the following assembler directives:
(i) DB (ii) Assume (iii) OFFSET (iv) PTR **(04 Marks)**

b. What is a flag and flag register? Explain the format of flag register with a suitable example. **(06 Marks)**

c. Write an assembly level program (ALP) to sort a given set of 'n' 16-bit numbers in descending order. Using Bubble sort algorithm to sort given elements. **(06 Marks)**

Module-2

3 a. Explain the following instructions with a suitable example:
(i) MOV (ii) PUSH (iii) LEA (iv) SHR
(v) ROL (vi) CMP (vii) DAA (viii) TEST. **(08 Marks)**

b. What is an interrupt? Explain various types with an interrupt vector table. **(08 Marks)**

OR

4 a. Explain the following instructions with a suitable example:
(i) XLAT (ii) RCR (iii) AAA (iv) MUL
(v) DIV (vi) LOOP (vii) ROL (viii) OR **(08 Marks)**

b. Explain rotate instructions with an example. **(08 Marks)**

Module-3

5 a. With example, explain how to identify overflow and underflow using flags in a flag register for performing an arithmetic operation on 16-bit numbers. **(08 Marks)**

b. Explain 74138 decoder configuration to enable the memory address 08000H to 0FFFFH to connect four 8K RAMS. **(08 Marks)**

OR

6 a. Briefly explain the control word format of 8255 IC in I/O mode and BSR mode. Find the control word if P_A = out, P_B = in , $P_{C0} - P_{C3}$ = in and $P_{C4} - P_{C7}$ = out. Use port address of 300H – 303H for the 8255 chip. Then get data from port A and send it to port B. **(08 Marks)**

b. Write an assembly level program (ALP) to read P_B and check number of one's in a 8-bit data as P_A and display FFh on P_A if it is even parity else 00h on Port A (P_A) if it is an odd parity. **(08 Marks)**

Module-4

7 a. Compare CISC with RISC. **(05 Marks)**

b. Explain registers used under various modes. **(05 Marks)**

c. Explain ARM core data flow model with a neat diagram. **(06 Marks)**

OR

8 a. Explain the architecture of a typical embedded device based in ARM core with a neat diagram. **(08 Marks)**

b. Explain the various fields in the current program status register. **(08 Marks)**

Module-5

9 a. Explain the following instructions of ARM processor with suitable example:
(i) MVN (ii) RSB (iii) ORR (iv) MLA
(v) SMULL (vi) LDR (vii) SWP (viii) SWPB **(08 Marks)**

b. Explain various formats of ADD instructions based on operands of ARM7 processor. **(04 Marks)**

c. If $r_5 = 5$, $r_7 = 8$ and using the following instruction, write values of r_5, r_7 after execution
MOV r_7, r_5, LSL ≠ 2 **(04 Marks)**

OR

10 a. Explain software interrupt instruction of ARM processor. **(06 Marks)**

b. Explain various types of SWAP instructions with syntax and example. **(06 Marks)**

c. What are the silent features of ARM instruction set? **(04 Marks)**

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CBCS Scheme

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Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Microprocessor and Microcontroller

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Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the architecture of 8086 microprocessor with a neat diagram along with functions of various blocks. **(06 Marks)**

b. With an example distinguish between physical address, logical address and offset address. If CS = 2000 h, DS = 3000 h, SS = 4000 h, ES = 5000 h, BX = 0020 h, BP = 0030 h. Find physical address for (i) MOV AL, [BP] (ii) MOV CX, [BX]. **(04 Marks)**

c. Explain the following addressing modes of 8086:
i) Register indirect
ii) Based indexed indirect
iii) Direct memory. **(06 Marks)**

OR

2 a. What are assembler directives? Explain the following assembler directives (i) PROC, (ii) Assume, (iii) PTR. **(04 Marks)**

b. Write assembly language program to add 5 bytes of data stored in data segment. **(04 Marks)**

c. With syntax, explain the following control transfer instructions:
i) Conditional transfer
ii) Unconditional transfer instruction. **(08 Marks)**

Module-2

3 a. Explain the syntax of following instructions with an example:
i) DAA ii) MUL iii) AND iv) SHR v) CMP vi) AAM **(06 Marks)**

b. Write a program to convert lower case to upper case by reading string from KB and print the converted string at 10^{th} row, 20^{th} column after clearing the screen. **(06 Marks)**

c. Write an ALP to count the number of one's and zero's in a given 8 bit data using rotate instructions. **(04 Marks)**

OR

4 a. Explain the syntax of following instructions with example: i) AAA, ii) Shl, iii) DIV, iv) RCR. **(04 Marks)**

b. What is an interrupt? Explain various types with an interrupt vector table. **(06 Marks)**

c. Write an ALP to sort a given set of 16 bit numbers in ascending order using any sorting method. **(06 Marks)**

Module-3

5 a. With an example, explain how to identify over flow and under flow using flags in a flag register for performing arithmetic operation on 16 bit number. **(06 Marks)**

b. Write the syntax of following instruction and explain with an example: (i) CBW, (ii) IDIV, (iii) CMPSB, (iv) Xlat. **(04 Marks)**

c. Design a memory system for 8086 with one 64 KB RAM and one 64 KB ROM at address 30000h and F0000h show the complete design along with memory mapping and draw the final diagram with address decoder. **(06 Marks)**

OR

6 a. With block diagram, explain 8255 and write control word register format for P_A output, P_B input in mode 0. **(06 Marks)**

b. Write an ALP to read P_B and check number of one's in a given 8 bit data at P_B and display FFh on P_A if it is even parity else 00h on P_A if it is odd parity. **(05 Marks)**

c. Write a program using string instructions to accept a string from keyboard and check for palindrome and accordingly display appropriate message. **(05 Marks)**

Module-4

7 a. Compare microprocessor with microcontroller. **(04 Marks)**

b. Explain the programmer's model of ARM processor with complete register sets available. **(04 Marks)**

c. With diagram explain the various blocks in a 3 stage pipeline of ARM processor organization. **(04 Marks)**

d. Explain registers used under various modes. **(04 Marks)**

OR

8 a. Explain the structure of ARM cross development tool kit. **(06 Marks)**

b. Describe the various modes of operation of ARM processor. **(05 Marks)**

c. Explain the various fields in Current Program Status Register (CPSR). **(05 Marks)**

Module-5

9 a. Explain the syntax with example the following instructions of ARM processor (i) MVN, (ii) RSB, (iii) ORR, (iv) MLA, (v) LDR. **(05 Marks)**

b. Write a program to display message "Hellow world" using ARM7 instructions. **(04 Marks)**

c. Explain various formats of add instructions based on operands of ARM7 processor. **(04 Marks)**

d. If $r_5 = 5$, $r_7 = 8$ and using the following instruction, write values of r_5, r_7 after execution MOV r_7, r_5, LSL # 2. **(03 Marks)**

OR

10 a. Explain software interrupt instruction of ARM processor. **(04 Marks)**

b. Explain various types of multiply instructions with syntax and example. **(04 Marks)**

c. What are the salient features of ARM instruction set? **(05 Marks)**

d. If $r_1 = 0b1111$, $r_2 = 0b0101$, find r_0 after BIC r_0, r_1, r_2. **(03 Marks)**

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Fourth Semester B.E. Degree Examination, June/July 2017
Microprocessors and Microcontrollers

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain execution unit (EU) and Bus interface unit (BIU) of 8086 µp with a neat diagram. **(08 Marks)**

b. Explain the different addressing modes used in 8086 µp with suitable example. **(08 Marks)**

OR

2 a. Explain all bits of flag register of 8086µp with a neat diagram. Show the setting and resetting of flag bits with a suitable example. **(06 Marks)**

b. Write an assembly level program (ALP) to add two bytes of data stored at data 1 and data 2 and save the result in sum with comments. Indentify all the directives found in the program. **(06 Marks)**

c. Show the memory dump for the following data section or data segment. **(04 Marks)**

```
                DATA
                ORG   0010H
DATA 1    DB    25
DATA 2    DB    10001001B
DATA 3    DB    12H
                ORG   0020H
DATA 4    DB    '2591'
                ORG   0030H
DATA 5    DW    9, 2, 7, 0CH, 00100000B, 5
                ORG   0040H
DATA 6    DW    4 DUP (00H)
```

Module-2

3 a. Explain Rotate instructions with suitable example. **(06 Marks)**

b. With a suitable program show how a packed BCD value is converted to ASCII value. **(04 Marks)**

c. Assume that there is a class of five people. With following grades: 69, 87, 96, 45, 75. Write an ALP to find the highest grade. **(06 Marks)**

OR

4 a. Write on ALP that adds the following two multiword numbers and saves the result:
Data 1 = 548FB9963CE7H and
Data 2 = 3FCD4FA23B8DH **(08 Marks)**

b. Write an ALP to perform the following :
i) Clear the screen
ii) Set the cursor at row 8 and column 5 of the screen.
iii) Prompt "There is a message for you from VTU : to read it enter Y. If the user enters 'Y' or 'y' then the message "Hello! All the best for your exams" will appear on the screen. If the user enters any other key, then the prompt "No more messages for you" should appear on the next line. **(08 Marks)**

Module-3

5 a. Explain handling of overflow problem arised in addition of signed numbers with a suitable example. **(06 Marks)**

b. Explain XLAT instruction with example. **(04 Marks)**

c. Explain 74138 decoder configuration to enable the memory address F0000H to F7FFFH to connect four 8k RAMS. **(06 Marks)**

OR

6 a. Briefly explain the control word format of 8255 in I/O mode and BSR mode. Find the control word if PA = out, PB = in, PC0 – PC3 = in and PC4 – PC7 = out. Use port addresses of 300H – 303H for the 8255 chip. Then get data from port B and send it to port A. **(08 Marks)**

b. Assume that we have 4 bytes of hexadecimal data: 25H, 62H, 3FH and 52H.

i) Find the checksum byte

ii) Perform the checksum operation to ensure data integrity.

iii) If the second byte 62H had been changed to 22H. Show how checksum detects the error. **(08 Marks)**

Module-4

7 a. Differentiate between RISC and CISC processors. **(06 Marks)**

b. Explain ARM core data flow model with a neat diagram. **(06 Marks)**

c. Discuss briefly how coprocessors can be attached to ARM processor. **(04 Marks)**

OR

8 a. Explain the architecture of a typical embedded device based on ARM core with a neat diagram. **(08 Marks)**

b. Explain the concept of pipeline and interrupts used in ARM processor. **(08 Marks)**

Module-5

9 a. Explain the following instructions of ARM processor with suitable example.
i) MLA ii) QADD iii) SMULL iv) LSL. **(08 Marks)**

b. Write an ALP to copy a block of data (Block 1) to another block (Block 2) using ARM instructions. **(08 Marks)**

OR

10 a. Write an ALP using ARM instructions that calls subroutine fact to find factorial of a given number. **(08 Marks)**

b. Write short notes on memory access and branch instructions of ARM controller. **(08 Marks)**

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