



Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Microprocessor and Microcontrollers

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume missing data suitably.

Module-1

- 1 a. Explain Execution Unit (EU) and Bus Interface Unit (BIU) of 8086 with a neat diagram. (08 Marks)
- b. With an example distinguish between physical address, logical address and offset address. If CS = 2000h, DS = 3000h, SS = 4000h, ES = 5000h, BX = 0030h, BP = 0020h, find the physical address for i) MOV AL, [BP] ii) MOV CX, [BX] iii) Add AX, 20[BX]. (06 Marks)
- c. Explain the following addressing modes of 8086:
i) Register Indirect
ii) Based Index
iii) Relative Based Index
iv) Direct Memory. (06 Marks)

OR

- 2 a. Explain all bits of flag register of 8086 μ_p with a neat diagram. Show the setting and resetting of flag bits with a suitable example. (06 Marks)
- b. What are Assembler directives? Explain the following assembler directives with an example: i) PUBLIC ii) ORG iii) ASSUME iv) PTR. (08 Marks)
- c. Develop an 8086 Assembly Language 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 an example: i) DAA ii) AAM iii) SHR iv) TEST v) LEA vi) PUSH vii) LDS viii) CBW. (08 Marks)
- b. What is an interrupt? Explain various types with an interrupt vector table. (06 Marks)
- c. Assume that there is a class of five people with following grades: 69, 87, 96, 45, 75. Develop an ALP to find the highest grade. (06 Marks)

OR

- 4 a. Develop an ALP that adds the following two multiword numbers and saves the result:
Data 1 = 548FB9963CE7H
Data 2 = 3FCD4FA23B8DH. (08 Marks)
- b. Develop 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 enter 'Y' or 'y' then the message "Hello! All the best for you 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)
- c. Develop an ALP to count the number of ones and zeros in a given 8 bit data using rotate instructions. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain handling of overflow problem that arises in addition of signed numbers with a suitable example. (06 Marks)
- b. Develop an ALP using string instructions to accept a string from keyboard and check for palindrome and display appropriate messages on the screen. (06 Marks)
- c. Design a memory system for 8086 with one 64KB RAM and one 64KB Rom at address 3000H to F000H show the complete design along with memory mapping and draw the final diagram with address decoder. (08 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 byte of hexadecimal data: 25H, 62H, 3FH and 52H
- Find the checksum byte
 - Perform the checksum operation to ensure data integrity.
 - If the second byte 62H had been changed to 22H. Show how checksum detects the error. (08 Marks)
- c. Explain XLAT instruction with example. (04 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. With diagram explain the various blocks in a 3 stage pipeline of ARM processor organization. (08 Marks)

OR

- 8 a. Explain the various fields in the current program status register. (08 Marks)
- b. Explain the architecture of a typical embedded device based in ARM core with a neat diagram. (08 Marks)
- c. Describe the various modes of operation of ARM processor. (04 Marks)

Module-5

- 9 a. Write/develop an ALP to copy a block of data (Block 1) to another block (block 2) using ARM instructions. (08 Marks)
- b. Explain the following instructions of ARM processor with suitable examples: (08 Marks)
- MLA
 - QADD
 - SMULL
 - LSL
- c. If r₅ = 5, r₇ = 8 using the following instructions, write values of r₅, r₇ after execution of MOV r₇, r₅, LSL #2. (04 Marks)

OR

- 10 a. Write short notes on:
- Memory access
 - Branch instruction of ARM controller. (08 Marks)
- b. Explain various types of SWAP instructions with syntax and example. (06 Marks)
- c. Develop an ALP to find factorial of given number using LOOKUP table and ARM instruction set. (06 Marks)

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