

Sixth Semester B.E. Degree Examination, June/July 2014
Microprocessors

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, selecting
at least TWO questions from each part.
2. Make suitable assumptions for any missing data.**

PART – A

- 1 a. Determine the appropriate register/memory locations that are used to compute the 5 digit hex address when the processor needs to address the contents of
 - i) Data segment memory. (08 Marks)
 - ii) Program segment memory. (05 Marks)
 - iii) Stack segment memory. (07 Marks)
 - iv) Extra segment memory.
- b. Explain the flag register of the processor in accordance with the respective bit positions.
- c. Write an 8086 assembly code to copy the contents of flag register into accumulator register following any arithmetic or logical operation.
- 2 a. Explain the meaning of the following independent bits of 8086 assembly instruction templates: i) W-bit; ii) d-bit; iii) v-bit; iv) s-bit; v) z-bit. (10 Marks)
- b. Write an optimum number of assembly instructions for the following objectives. Also indicate the type of addressing mode used in each case.
 - i) Shift the contents of accumulator register 4 bits left.
 - ii) Rotate the contents of base register right by 2 bits.
 - iii) Divide the contents of accumulator register by 2.
 - iv) Multiply the contents of base register by 4.
 - v) If AL register contains a two digit BCD number, display the same on monitor using necessary DOS interrupts. (10 Marks)
- 3 a. Consider that a symbolic memory address 'DISPTBL' contains a BCD to seven segment code starting from 4000H to 400AH. Design an assembly code to meet the following objectives:
 - i) Send a message to screen 'PRESS ANY KEY 0 to 9'.
 - ii) Read the key pressed from the key board.
 - iii) If invalid key is found, the program to loop back to step (i) with a suitable warning message.
 - iv) On correct key press, compute BCD to 7 segment code and store into memory location 'DISPCODE'.
 - v) Use XLAT assembly instruction to achieve your objective.
 - vi) Design a suitable flow diagram to show your approach. (10 Marks)
- b.
 - i) Differentiate between the usage of assembler directives MACRO and PROCEDURE.
 - ii) Develop a suitable MASM code to display minimum of 3 different line text message by using MACRO directive and PRINTF as macro name. (10 Marks)

- 4 a. With reference to the internal architecture of 8086 processor, explain:
- The different external sources external sources of hardware interrupts.
 - How the processor checks to see an interrupt have been occurred.
 - List of major actions performed to process an interrupt. (10 Marks)
- b. Explain the following internal interrupts generated within the processor while executing the program:
- TYPE-0 divide by zero interrupt.
 - TYPE-1 single step interrupt. (10 Marks)

PART – B

- 5 a. With respect to programmable peripheral interface (PPI) 8255A:
- Draw a neat block schematic showing its functional description.
 - Draw mode definition format the control word.
 - Explain various possible modes of operation. (10 Marks)
- b. Design an 8255 based event counting system. Port A is connected to 8LEDs and Port B is connected to a toggling switch having 2 positions for binary and BCD. Draw the interfacing diagram and a program for binary or BCD count as selected by switch. Given that the control port address is 50B3, assume safe current to glow each LED is 25mA. A suitable delay between counts is considered. (10 Marks)
- 6 a. What is meant by numeric data processor 8087 (NDP)? What are the benefits of interfacing the same with the host processor? (04 Marks)
- b. Explain briefly the role played by the following pins of 8087 during interaction.
- Bus high enable (BHE/S7).
 - Status pins ($\overline{s2}, \overline{s1}, \overline{s0}$).
 - Request/Grant ($\overline{RQ}/\overline{GT}$). (06 Marks)
- c. Consider the given decimal number 178.625 convert it into
- Short-real format (single precision representation).
 - Long-real format (double precision representation). (04 Marks)
- d. Write a program to calculate the volume of a sphere having radius of the sphere is specified. The result is to be stored in the memory location VOLUME. Volume of a sphere is given by $(4/3) * (Pi) * (r^{**3})$. (06 Marks)
- 7 a. Draw a schematic diagram when 8086 processor is operating in maximum mode configuration. (06 Marks)
- b. Explain the function performed by pins exclusive for minimum mode configuration.
- HOLD and HLDA ; ii) $\overline{M}/\overline{IO}$; iii) \overline{RD} ; iv) \overline{WR} ; v) $\overline{MN}/\overline{MX}$. (08 Marks)
- c. What is meant by PCI bus system? List out the significant characteristics of the PCI bus system. (06 Marks)
- 8 a. Explain the memory bank system architecture for the 80386DX microprocessor with a block schematic. Explain how interleaved memory system is used for speed improvement. (10 Marks)
- b. Draw the block schematic of the control register of 80386 microprocessor and explain the following special control bits of operation i) PG; ii) ET; iii) TS; iv) EM; v) MP; vi) PE. (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2013/Jan.2014

Microprocessor

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. Explain the functions of the following units with reference to 8086 CPU:
 - (i) Instruction Queue (ii) Index Registers (iii) Segment Registers (09 Marks)
- b. Explain the generation of 20-bit physical address in case of based addressing with 16-bit displacement. (05 Marks)
- c. List and explain the need of status and control flags in 8086. (06 Marks)
2. a. Explain the significance of the following pins of 8086:
 - (i) ALE (ii) RESET (iii) LOCK (iv) MN/MX (06 Marks)
- b. Differentiate the following instruction:
 - (i) MOV AX, DS:35H and MOV AX, 35H
 - (ii) AND and TEST (08 Marks)
 - (iii) Shift and Rotate
- c. Write an assembly language program to find the number of 1's and 0's for an 8-bit data. (06 Marks)
3. a. Explain the use of REP prefix for MOVS and STOS string instructions. (05 Marks)
- b. Write an ALP to perform the following using string instructions:
 - (i) Reverse a string (ii) Check for a palindrome. (10 Marks)
- c. Write the interrupt structure of 8086. (05 Marks)
4. a. Bring out the differences between MACRO and PROCEDURE. (04 Marks)
- b. Write an ALP to find the factorial of a number using a procedure. (10 Marks)
- c. Explain the response of 8086 when NMI and INTR pins are activated. (06 Marks)

PART – B

5. a. Explain the control word format of 8255 PPI. (05 Marks)
- b. Interface a matrix keyboard to 8086 using 8255 and explain its operation. (10 Marks)
- c. Write a short note on different types of key switches used in computers. (05 Marks)
6. a. Illustrate the need for an arithmetic coprocessor in a microcomputer system. (05 Marks)
- b. Explain the different data types of 8087 with examples. (10 Marks)
- c. Explain the control Register format of 8087. (05 Marks)
7. a. With a relevant block diagram, explain the maximum mode operation of 8086. (10 Marks)
- b. Write an ALP to interface a stepper motor to 8086. (10 Marks)
8. Write short notes on :
 - a. Universal Serial Bus (USB)
 - b. Peripheral Component Interconnect (PCI)
 - c. Pentium Processor
 - d. Special registers in 80386 CPU. (20 Marks)

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Microprocessors

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PART – A

1. a. Explain with block diagram the personal computer model showing address, data and control bus structure. (05 Marks)
- b. With a neat sketch, explain the execution unit and bus interface unit of the 8086 microprocessor. (10 Marks)
- c. Explain segmentation in 8086 and advantages of using segment registers. (05 Marks)
2. a. Explain the different string instructions of the 8086. (08 Marks)
- b. What are assembler directives? Explain the following : (08 Marks)
 - (i) total db 00h
 - (ii) inc word ptr [si]
 - (iii) mov dx, offset msg
 - (iv) assume
- c. Explain : (04 Marks)
 - (i) $\overline{MN} / \overline{MX}$
 - (ii) $AD_{15} - AD_0$
 - (iii) \overline{RD}
 - (iv) \overline{WR}
3. a. Write a display macro using for statement to display 'VTU' on the screen. (05 Marks)
- b. Write an assembly language program to arrange '10' bytes of data in descending order. (10 Marks)
- c. Differentiate between macros and procedures. (05 Marks)
4. a. Draw the 8086 interrupt-pointer table and explain the dedicated interrupt pointers, reserved interrupt pointers and available interrupt pointers. (10 Marks)
- b. Explain the priority of 8086 interrupts. (05 Marks)
- c. Write a program to check if a given byte is bitwise palindrome. (05 Marks)

PART – B

5. a. Explain the different key switches used on keyboards. (08 Marks)
- b. Explain the detection of matrix keyboard, key press, debouncing and encoding with a microcomputer using 4*4 keyboard. Also draw the flowchart for the same. (12 Marks)
6. a. Explain the 8087 architecture. Also explain the bit pattern of status register and control register. (12 Marks)
- b. Explain : (08 Marks)
 - (i) FLDZ
 - (ii) FLD1
 - (iii) FLDPI
 - (iv) FLDL2E
7. a. Write a note on parallel printer interface (LPT). (10 Marks)
- b. Explain the write cycle timing diagram for minimum mode. (07 Marks)
- c. Explain the following : (03 Marks)
 - (i) M / \overline{IO}
 - (ii) ALE
 - (iii) \overline{INTA}
8. a. Draw the internal programming model of the 80486 and explain. (10 Marks)
- b. Explain the memory system of 80386. (05 Marks)
- c. Write a brief note on Pentium processors. (05 Marks)
