

Digital Techniques and Microprocessors (313305)

MSBTE Diploma · K-Scheme · Model Question Paper — Set B

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of non-programmable electronic pocket calculator is permissible.
7. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) State any two applications each of Gray code and ASCII code.
- b) Draw the symbol and write the truth table of NAND gate and EX-NOR gate.
- c) List any four Boolean laws.
- d) State the use of the following directives with example: i) DW ii) DUP.
- e) State the function of: i) Assembler ii) Linker.
- f) State the use of SI, DI and IP registers of 8086.
- g) State the function of STC, CLC, CLD and STD instructions.

Q.2 Attempt any THREE of the following:**12**

- a) Convert the following:
i) $(101101.101)_2 = (?)_{10}$ ii) $(725)_8 = (?)_{16}$
- b) Design a half subtractor. Write its truth table, simplify using K-map and draw the logic diagram.
- c) Explain the generation of physical address in 8086 with a diagram. Calculate the physical address for i) 2000H : 3456H ii) 5A10H : 0FF0H.
- d) Write 8086 instructions to:
i) Multiply the contents of AL by 8 using shift instruction.
ii) Initialise the stack segment at 3000H and stack pointer at 0FFEh.
iii) Clear AX register using a logical instruction.
iv) Rotate the contents of BX right through carry by 2 positions.

Q.3 Attempt any THREE of the following:**12**

- a) Minimize the following expression using K-map and draw the logic diagram:
 $F(A, B, C, D) = \sum m(1, 3, 7, 11, 15) + d(0, 2, 5)$

- b) Perform $(10110101)_2 - (01101110)_2$ using i) 1's complement method ii) 2's complement method.
- c) Explain any four shift and rotate instructions of 8086 with example.
- d) Draw the minimum mode configuration of 8086 and explain it.

Q.4 Attempt any THREE of the following:

12

- a) Realize AND, OR, NOT and NAND gates using NOR gates only.
- b) Describe memory segmentation in 8086. State its advantages.
- c) Describe the function of the following pins of 8086: i) $\overline{RD}$ ii) READY iii) $\overline{M/\overline{IO}}$ iv) HOLD.
- d) Identify the addressing mode of the following instructions:
i) MOV AX, BX ii) MOV CL, 25H iii) MOV AL, [2000H] iv) MOV AX, [BX]
v) MOV DX, [SI + 10H] vi) MOV AX, [BX + DI + 05H] vii) ADD AL, [BP + 04H] viii) MOV [DI], AL
- e) Write an assembly language program to find the smallest number from an array of 10 bytes.

Q.5 Attempt any TWO of the following:

12

- a) i) Draw the logic diagram of 1 : 4 demultiplexer using logic gates and write its truth table.
ii) Design a 1 : 16 demultiplexer using 1 : 4 demultiplexers.
- b) Draw the pin diagram of 8086 and describe the function of the following pins: $\overline{MN/\overline{MX}}$, $\overline{BHE/S7}$, $\overline{TEST}$, NMI, INTR and RESET.
- c) Write an assembly language program to arrange 10 numbers in descending order. Draw the flowchart for the same.

Q.6 Attempt any TWO of the following:

12

- a) Explain the following in short with diagram: i) Combinational circuit ii) Sequential circuit iii) Latch iv) Clock signal.
- b) i) State and prove De Morgan's theorems.
ii) Simplify $Y = (A + B)(A + C)$ using Boolean laws and verify using truth table.
- c) Write an assembly language program to transfer a block of 10 bytes from one memory location to another i) using string instruction ii) without using string instruction.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in