

Digital Techniques and Microprocessors (313305)

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

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) Convert: i) $(10110110)_2$ into Gray code ii) $(59)_{10}$ into BCD.
- b) Why are NAND and NOR gates called universal gates? Draw their symbols.
- c) State any two applications each of flip-flop and counter.
- d) Draw the labelled format of flag register of 8086.
- e) List the addressing modes of 8086.
- f) State the use of the following directives with example: i) DD ii) EQU.
- g) Write an assembly language program to add two 8-bit numbers.

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

- a) State De Morgan's theorems. Reduce the following using Boolean laws:
i) $Y = AB + \overline{A}\overline{B} + \overline{A}B$ ii) $Y = AB + A(B + C) + B(B + C)$
- b) Draw the logic diagram of 8 : 1 multiplexer and write its truth table.
- c) Explain pipelining in 8086 with a diagram. State its advantages.
- d) Write an assembly language program to concatenate two strings.

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

- a) Convert $(583)_{10}$ into octal and hexadecimal. Explain the steps.
- b) Minimize the following expression using K-map and draw the logic diagram:
 $F(A, B, C, D) = \Pi M(0, 1, 4, 5, 6, 8, 9, 12, 13, 14)$
- c) Differentiate between minimum mode and maximum mode of 8086 (any four points).
- d) Describe the following with example: i) MOVSW ii) CMPSW iii) STOSB
iv) REP prefix.

Q.4 Attempt any THREE of the following:

12

- a) Write the Boolean expression for the output Y of the logic circuit shown in Fig. No. 1 and write its truth table.

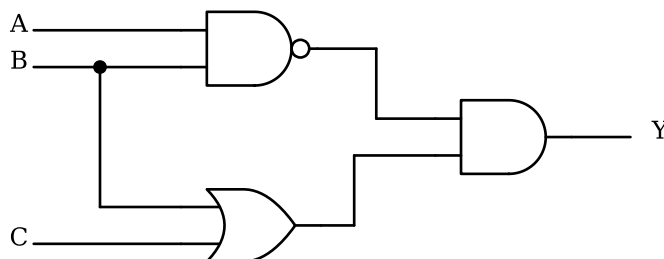


Fig. No. 1

- b) i) Add $(57)_{10}$ and $(68)_{10}$ in BCD.
 ii) Perform $(01011001)_2 - (01110011)_2$ using 2's complement method.
- c) Describe memory segmentation in 8086. Calculate the physical address when CS = 1A2BH and IP = 3C4DH.
- d) Explain the following instructions with example: i) PUSH ii) IDIV iii) XCHG iv) LOOP.
- e) Write an assembly language program to count the occurrence of a given number in an array of 10 bytes.

Q.5 Attempt any TWO of the following:

12

- a) Design a 3-bit asynchronous (ripple) up counter using J-K flip-flops. Draw its logic diagram, truth table and timing diagram.
- b) Explain the minimum mode configuration of 8086 in detail with a neat diagram.
- c) Write an assembly language program to arrange ten 16-bit numbers in ascending order. Draw the flowchart for the same.

Q.6 Attempt any TWO of the following:

12

- a) Design a full adder using K-map and draw its logic diagram. Also implement the full adder using two half adders.
- b) Write the contents of AL and the status of CF, AF and ZF after execution of each instruction:
 MOV AL, 79H / ADD AL, 25H / DAA / MOV BL, 47H / ADD AL, BL / DAA
- c) Write an assembly language program to multiply two 2-digit BCD numbers. Draw the flowchart for the same.

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