**2023**

# INFORMATION TECHNOLOGY

Paper : ITBHC3056

**( Digital Logic and ICT )**

Full Marks : 60

Pass Marks : 24

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

1. Choose the correct answer (any *five*) :　1×5=5

    (a) A register capable of incrementing and/or decrementing its contents is termed as

    　　(i) counter

    　　(ii) decoder

    　　(iii) multiplexer

    　　(iv) demultiplexer

    (b) In Boolean algebra $(A \cdot \bar{A}) + A = ?$

    　　(i) 0

    　　(ii) A

    　　(iii) $\bar{A}$

    　　(iv) 1

24KB/**80**　　　　　　　　　　( *Turn Over* )

(c) *D* flip-flop can be made from a *J-K* flip-flop by making which of the following conditions?

(i) $J = K$

(ii) $J = K = 1$

(iii) $J = 0, K = 1$

(iv) $J = \bar{K}$

(d) How many entries will be in the truth table of a 5-input NAND gate?

(i) 6

(ii) 8

(iii) 32

(iv) 16

(e) In the toggle mode, a *J-K* flip-flop has

(i) $J = 0, K = 1$

(ii) $J = 1, K = 1$

(iii) $J = 0, K = 0$

(iv) $J = 1, K = 0$

(f) The total amount of memory depends upon

(i) the organization of memory

(ii) the size of decoding unit

(iii) the size of the address bus of microprocessor

(iv) the structure of memory

(g) Which memory uses the concept of tracks and sectors?

(i) SRAM

(ii) Hard disk

(iii) DRAM

(iv) Magnetic tape

(h) Which memory cannot be accessed directly by the CPU of the computer?

(i) RAM

(ii) Cache memory

(iii) ROM

(iv) Memory card

(i) Which of the following is used in main memory?

(i) DRAM

(ii) DDR

(iii) SRAM

(iv) PRAM

(j) Which of the following is the fastest memory?

(i) Hard Disk

(ii) DVD ROMs

(iii) Static RAM

(iv) Cache Memory

2. Answer the following questions (any *five*) :

$$2 \times 5 = 10$$

(a) State and prove De Morgan's law.

(b) What is modern computer?

(c) Differentiate between adder and subtractor.

(d) What do you mean by flip-flop? Write any two uses of flip-flop.

(e) List any four names of intel processor family.

(f) What is CD-ROM?

(g) What do you mean by defragmentation?

3. Answer the following questions (any *five*) :

$$5 \times 5 = 25$$

(a) Simplify the Boolean function to the required number of literals : 2½+2½=5

(i) $AB + AB'C + BC'$

(ii) $(X + XY)(X + X'Y)(X + Z)$

(b) What is PLA? Implement the following function using PLA : 1+4=5

$$F_1 = \Sigma_m(3, 5, 7)$$
$$F_2 = \Sigma_m(4, 5, 7)$$

(c) State five differences between cache memory and virtual memory. 5

( Continued )

(d) Explain the following terms : 2½+2½=5

(i) Keyboard

(ii) Speaker

(e) What do you mean by minterm and maxterm? Find out the minterm and maxterm expressions for the following equation : 2+3=5

$$Y = \Sigma(5, 6, 7, 9, 11, 12)$$

(f) Define RAM. Explain the different kinds of RAM. 1+4=5

(g) Design (8 : 1) multiplexer. Draw its logic diagram. 5

(h) Explain the following terms : 2½+2½=5

(i) CD

(ii) DVD

(i) Write any five applications of demux. 5

4. Answer the following questions (any *two*) :

$$10 \times 2 = 20$$

(a) What is *J-K* flip-flop? Find out the characteristic equation of *J-K* flip-flop using characteristic table. How is *D* flip-flop different from *J-K* flip-flop? Write any three applications of *J-K* flip-flop. 1+3+3+3=10

( Turn Over )

(b) (i) What do you mean by Karnaugh map? Simplify the following expression using K-map : 5

$$Y = (0, 1, 3, 5, 7, 8, 9, 10, 11)$$

(ii) What is logic gates? Explain different type of logic gates using truth table. 5

(c) Define motherboard. What are the different types of motherboard? Explain. 10

(d) (i) Write the differences between edge triggering and level triggering.

(ii) Explain FAT and NTFS file system.

(iii) Explain decoder using truth table.

3+4+3=10

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