



BCA/DEL-204

2024

(2nd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DEL-204

(Digital Electronics)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

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

1. (a) What is De Morgan's law? Prove De Morgan's first law and second law with a neat circuit diagram and truth table. 7
- (b) Design a logic circuit diagram of AND gate using NOR universal gate. 2

Or

- (c) What is full-adder? Evaluate the algebraic expression for sum and carry with circuit diagram and truth table. 7
- (d) Design a logic circuit diagram of NOR gate using NAND universal gate. 2
2. (a) What is multiplexer? Explain 4×1 multiplexer with a neat circuit diagram and truth table. 5
- (b) Reduce the logic function using Karnaugh map : 4

$$Y = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{C}D + \overline{A}\overline{B}C\overline{D} + \overline{A}\overline{B}CD \\ + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}BC\overline{D}$$

Or

- (c) What is encoder? Explain decimal-to-BCD encoder with a neat circuit diagram and truth table. 5
- (d) Reduce the logic function using Karnaugh map : 4

$$Y = \overline{A}\overline{B}CD + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}BCD \\ + A\overline{B}\overline{C}\overline{D} + A\overline{B}\overline{C}D + ABCD \\ + ABC\overline{D} + ABCD$$

3. (a) Write short notes on the following : 4
- (i) Static RAM
- (ii) Dynamic RAM

- (b) Explain the construction and working of J-K-M-S flip-flop with circuit diagram and truth table. 5

Or

- (c) Write short notes on the following : 4
(i) Volatile memory
(ii) Non-volatile memory

- (d) Explain the construction and working of J-K flip-flop with circuit diagram and truth table.. 5

4. (a) Explain the construction and working of 4-bit ripple up counter with circuit diagram and truth table. 5

- (b) Explain the construction and working of MOD-7 ripple counter with circuit diagram and truth table. 4

Or

- (c) What is decade counter? Explain its logic diagram with the help of truth table. 4

- (d) With the logic diagram and truth table, explain the operation of 4-bit ripple down counter. 5

5. (a) Explain the working and construction of dual-slope A/D converter with circuit diagram. 4
- (b) Explain the construction and working of binary weighted D/A converter. 5
- Or
- (c) Explain the working and construction of parallel A/D converter with suitable circuit diagram. 5
- (d) Explain the working and construction of R/2R ladder network converter with suitable circuit diagram. 4

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(2nd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DEL-204

(Digital Electronics)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

1. Choose the most appropriate answer from the given options by putting a Tick (✓) mark in the brackets provided : 1×10=10

(a) The binary equivalent of the decimal number $(52.625)_{10}$ is

- | | |
|-------------------------|--------|
| (i) $(110101.1010)_2$ | () |
| (ii) $(110101.1001)_2$ | () |
| (iii) $(100101.1010)_2$ | () |
| (iv) $(110110.1010)_2$ | () |

(b) How many AND gates are required to realize the expression $Y = AB + BC$?

(i) 4 ()

(ii) 8 ()

(iii) 1 ()

(iv) 2 ()

(c) A _____ is a circuit with only one output but can have multiple inputs.

(i) logic gate ()

(ii) truth table ()

(iii) binary circuit ()

(iv) Boolean circuit ()

(d) The number of cells in a K-map with n -variables is

(i) $2n$ ()

(ii) n^2 ()

(iii) 2^n ()

(iv) n ()

(e) The logic circuits whose outputs at any instant of time depend only on the present input but also on the past output are called

(i) combinational circuits ()

(ii) sequential circuits ()

(iii) latches ()

(iv) flip-flops ()

(f) D flip-flop can be made from a J-K flip-flop by making

(i) $J = K$ ()

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

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

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

(g) Which of the following input combinations is not allowed in an S-R flip-flop?

(i) $S = 0, R = 0$ ()

(ii) $S = 0, R = 1$ ()

(iii) $S = 1, R = 0$ ()

(iv) $S = 1, R = 1$ ()

(h) Which of the following is a non-volatile memory?

(i) ROM ()

(ii) RAM ()

(iii) PLA ()

(iv) PLD ()

(i) Which of the following methods is employed for ADC?

(i) Ladder network ()

(ii) Successive approximation type ()

(iii) PWM type ()

(iv) None of the above ()

(j) In 8-bit microprocessor, how many opcodes are present?

(i) 246 ()

(ii) 278 ()

(iii) 250 ()

(iv) 256 ()

2. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark : 1×5=5

(a) There are five universal gates.

(T / F)

(b) BCD to seven-segment conversion is a decoding process.

(T / F)

(c) In SDRAM, buffers are used to store data that is read or written.

(T / F)

(d) The full form of SIPO is serial-in-peripheral-out.

(T / F)

(e) Typical conversion speed of APC is less than 100 μ s.

(T / F)

3. Answer the following questions :

$2 \times 5 = 10$

- (a) Find 2's complement of binary number
10101110.

- (b) Write the differences between the sum of product (SOP) and the product of sum (POS) in digital logic.

- (c) Draw the logic diagram and truth table of *D* flip-flop.

(d) Define the following :

- (i) Asynchronous counter
- (ii) Synchronous counter

(e) Define the following :

(i) Quads in K-map

(ii) Octets in K-map
