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(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) Design a logic circuit diagram of AND using NOR universal gate and write its truth table.

3

- (b) Design a logic diagram of full adder and write its truth table. Evaluate the expression for sum and carry.

6

(2)

Or

- (c) Explain De Morgan's first and second laws with a neat logic diagram and truth table. 6
- (d) Design a logic diagram of half subtractor and write its truth table. 3
2. (a) What is a multiplexer? Explain 8 : 1 multiplexer with a neat logic diagram and truth table. 4
- (b) Simplify the following Boolean function using K-map : 5
- $$F(P, Q, R, S) = \Sigma(0, 1, 3, 5, 7, 8, 9, 11, 13, 15)$$
- Or
- (c) What is a decoder? Explain BCD to decimal decoder with a neat logic diagram. 4
- (d) Simplify the following Boolean function using K-map : 5
- $$F(A, B, C, D) = \Sigma(0, 2, 8, 10, 14) + \Sigma d(5, 15)$$
3. (a) What is J-K flip-flop? Draw the symbol, circuit diagram of J-K flip-flop and explain it with the help of truth table. 5

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(Continued)

(3)

- (b) Draw the symbol and circuit diagram, and write the truth table of T flip-flop. 4

Or

- (c) Draw the symbol and circuit diagram of Master-Slave J-K flip-flop, and explain its operation with the help of truth table. 5
- (d) Write short notes on the following : 4
- (i) ROM and RAM
- (ii) EPROM and EEPROM
4. (a) Differentiate between synchronous counter and asynchronous counter. 4
- (b) Explain MOD-7 ripple counter with suitable diagram. 5
- Or
- (c) Explain 4-bit synchronous up counter with suitable diagram. 5
- (d) Write notes on the following : 4
- (i) SIPO
- (ii) PISO
5. (a) Explain the working of parallel comparator A/D converter with the help of a diagram. 4

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(Turn Over)

(43)

- (b) Explain the operation of binary weighted D/A converter with a neat diagram.

5

Or

- (c) Explain the working of successive ADC with a neat diagram.

4

- (d) Explain the operation of $R/2R$ ladder network converter with the help of diagram.

5

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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) What is the binary representation of the decimal number 13?

(i) 1010 ()

(ii) 1101 ()

(iii) 1110 ()

(iv) 1001 ()

(2)

(b) Which group is represented as universal gate?

- (i) AND, OR ()
- (ii) NAND, NOR ()
- (iii) NOT, NOR, NAND ()
- (iv) AND, OR, NOT ()

(c) The expression $Y = (A + B) \cdot (B + C)$ shows the _____ operation.

- (i) EX-OR ()
- (ii) SOP ()
- (iii) POS ()
- (iv) NOR ()

(d) 2's complement of 01101 is

- (i) 10010 ()
- (ii) 10011 ()
- (iii) 01110 ()
- (iv) 11001 ()

(3)

(e) How many select lines are required for a 2 : 1 multiplexer?

- (i) 1 ()
- (ii) 2 ()
- (iii) 3 ()
- (iv) 4 ()

(f) A decoder is a combinational circuit that converts an n -bit binary input into how many output lines?

- (i) n ()
- (ii) $2n$ ()
- (iii) 2^n ()
- (iv) n^2 ()

(g) Which of the following is not a type of memory?

- (i) RAM ()
- (ii) ROM ()
- (iii) EPROM ()
- (iv) ALU ()

(4)

(h) If a 7-bit binary number is 1010101 and even parity is used, what will be the complete 8-bit code transmitted?

(i) 10101010 ()

(ii) 10101011 ()

(iii) 11010101 ()

(iv) 10101000 ()

(i) In S-R flip-flop, if $Q = 1$, the output is said to be

(i) set ()

(ii) reset ()

(iii) previous state ()

(iv) current state ()

(j) A counter circuit is usually constructed of

(i) a number of latches connected in cascade form ()

(ii) a number of NAND gates connected in cascade form ()

(iii) a number of flip-flop connected in cascade form ()

(iv) a number of NOR gates connected in cascade form ()

(5)

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

(a) A demultiplexer is a device used to select one of many data inputs and route it to a single output.

(T / F)

(b) There are 15 cells in a 4-variable K-map.

(T / F)

(c) A shift register is a sequential circuit that can be used to temporarily store and shift data, but it is not a type of counter.

(T / F)

(d) The 1's complement of 11001 is 00111.

(T / F)

(e) Excess-3 code of binary number 0100 is 0111.

(T / F)

(6)

3. Answer the following questions : $2 \times 5 = 10$

(a) Convert $(545.67)_{10}$ to octal number.

(7)

(b) Convert $(100111)_G$ to binary code.

(8)

- (c) Simplify the following Boolean function using SOP and draw its equivalent logic diagram :

$$F(A, B, C) = \Sigma(m_1, m_2, m_4, m_6)$$

(9)

- (d) Reduce the following logic function using K-map :

$$Y = \bar{A}BC + \bar{A}\bar{B}\bar{C} + ABC + ABC$$

(10)

- (e) Write the truth table of 8 : 3 encoder and draw its equivalent logic diagram.
