

# Εργασία 1 Σχεδίαση ψηφιακών συστημάτων

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## Πρόβλημα 1

### Ερωτήματα 3

$$f(x_1, x_2, x_3, x_4, x_5) = \sum m(0, 2, 4, 7, 8, 10, 12, 16, 18, 20, 23, 25, 26, 28) + \prod d(15, 21, 24, 27)$$

| Αρ. 1 | minterm | Διαδίωξη αναπαράστασης |   |
|-------|---------|------------------------|---|
| 0     | 0       | 00000                  | ✓ |
| 1     | 2       | 00010                  | ✓ |
|       | 4       | 00100                  | ✓ |
|       | 8       | 01000                  | ✓ |
|       | 16      | 10000                  | ✓ |
| 2     | 10      | 01010                  | ✓ |
|       | 12      | 01100                  | ✓ |
|       | 18      | 10010                  | ✓ |
|       | 20      | 10100                  | ✓ |
| 3     | 7       | 00111                  | ✓ |
|       | 21      | 10101                  | ✓ |
|       | 25      | 11001                  | ✓ |
|       | 26      | 11010                  | ✓ |
| 4     | 23      | 11100                  | ✓ |
|       | 15      | 01111                  | ✓ |
|       | 27      | 10111                  | ✓ |
|       | 24      | 11011                  | ✓ |

| minterm | Διαδίωξη αναπαράστασης |
|---------|------------------------|
| 0, 2    | 000x0                  |
| 0, 4    | 00x00                  |
| 0, 8    | 0x000                  |
| 0, 16   | x0000                  |
| 2, 10   | 0x010                  |
| 2, 12   | x0010                  |
| 4, 12   | 0x100                  |
| 4, 20   | x0100                  |
| 8, 10   | 010x0                  |
| 8, 12   | 01x00                  |
| 8, 24   | x1000                  |
| 16, 18  | 100x0                  |
| 16, 20  | 10x00                  |
| 16, 24  | 1x000                  |

| minterm        | Διαδίωξη αναπαράστασης |
|----------------|------------------------|
| 0, 2, 8, 10    | 0x0x0                  |
| 0, 4, 8, 12    | 0xx00                  |
| 0, 2, 16, 18   | x00x0                  |
| 0, 4, 16, 20   | x0x00                  |
| 0, 8, 16, 24   | xx000                  |
| 2, 10, 18, 26  | xx010                  |
| 4, 12, 20, 28  | xx100                  |
| 8, 10, 24, 26  | x10x0                  |
| 8, 12, 24, 28  | x1x00                  |
| 16, 18, 24, 26 | 1x0x0                  |
| 16, 20, 24, 28 | 1xx00                  |
| 24, 26, 28, 27 | 110xx                  |

|        |       |
|--------|-------|
| 10, 26 | x1010 |
| 12, 28 | x1100 |
| 18, 26 | 1x010 |
| 20, 21 | 1010x |
| 24, 25 | 1100x |
| 24, 26 | 110x0 |
| 24, 28 | 11x00 |
| 7, 15  | 0x111 |
| 7, 23  | x0111 |
| 21, 23 | 101x1 |
| 25, 27 | 110x1 |
| 26, 27 | 1101x |

P1

P2

P3

P4

P3

| minterm                     | Διαδίωξη αναπαράστασης |
|-----------------------------|------------------------|
| 0, 2, 8, 10, 16, 18, 24, 26 | xx0x0                  |
| 0, 4, 8, 12, 16, 20, 24, 28 | xxx00                  |

P6

P7

| Πρώτος Όρος Μιντέρας | 0 | 2 | 4 | 7 | 8 | 10 | 12 | 16 | 18 | 20 | 23 | 25 | 26 | 28 |
|----------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| P1 = 1010x           |   |   |   |   |   |    |    |    |    | x  |    |    |    |    |
| P2 = 0x111           |   |   |   | x |   |    |    |    |    |    |    |    |    |    |
| P3 = x0111           |   |   |   | x |   |    |    |    |    | x  |    |    |    |    |
| P4 = 101x1           |   |   |   |   |   |    |    |    |    |    | x  |    |    |    |
| P5 = 110xx           |   |   |   |   |   |    |    |    |    |    |    | x  | x  |    |
| P6 = xx0x0           | x | x |   |   | x | x  |    | x  | x  |    |    |    | x  |    |
| P7 = xxx00           | x |   | x |   | x |    | x  | x  |    | x  |    |    |    | x  |

| Πρώτος Όρος Μιντέρας | 0 | 2 | 4 | 7 | 8 | 10 | 12 | 16 | 18 | 20 | 23 | 25 | 26 | 28 |
|----------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| P3 = x0111           |   |   |   | x |   |    |    |    |    |    | x  |    |    |    |
| P5 = 110xx           |   |   |   |   |   |    |    |    |    |    |    | x  | x  |    |
| P6 = xx0x0           | x | x |   |   | x | x  |    | x  | x  |    |    |    | x  |    |
| P7 = xxx00           | x |   | x |   | x |    | x  | x  |    | x  |    |    |    | x  |

Μετα από τον πίνακα έχουμε:

$$f = \bar{x}_2 x_3 x_4 x_5 + x_1 x_2 \bar{x}_3 + \bar{x}_3 \bar{x}_5 + \bar{x}_4 \bar{x}_5$$