**ASSIGNMENT NO:2**

**Course: CS302**

**1: Write the SOP expression for the given sum.**

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**Sol**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **E** |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **E** | **OUTPUT**  **(F)** |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 | 0 |

**FOR SOP WE FOCUS ON 1 VALUE.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **E** | **MINTERM** |
| **0** | **0** | **0** | **1** | **0** |  |
| **0** | **0** | **1** | **0** | **0** |  |
| **0** | **0** | **1** | **1** | **0** |  |
| **0** | **1** | **0** | **0** | **0** |  |
| **0** | **1** | **0** | **1** | **0** |  |
| **0** | **1** | **1** | **0** | **0** |  |
| **0** | **1** | **1** | **1** | **0** |  |
| **1** | **0** | **0** | **0** | **0** |  |
| **1** | **0** | **0** | **1** | **0** |  |
| **1** | **0** | **1** | **0** | **0** |  |
| **1** | **1** | **1** | **0** | **0** |  |
| **1** | **1** | **0** | **0** | **0** |  |
| **1** | **1** | **0** | **1** | **0** |  |
| **1** | **1** | **1** | **0** | **0** |  |
| **1** | **1** | **1** | **1** | **1** | **ABCDE** |

**SOP EXPRESSION:**

**SUM OF PRODUCT EXPRESSION**

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**2: Find Prime Implicant of minterm using QuineMcculsky method.**

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**Step-1**

|  |  |
| --- | --- |
| 00010 | 2 |
| 00100 | 4 |
| 01000 | 8 |
| 10000 | 16 |
| 00110 | 6 |
| 01010 | 10 |
| 01100 | 12 |
| 10010 | 18 |
| 10100 | 20 |
| 11000 | 24 |
| 01110 | 14 |
| 10110 | 22 |
| 11010 | 26 |
| 11100 | 28 |
| 11110 | 30 |

**Step-2**

2,6(00-10) 2,10(0-010) 2,18(-0010)

4,12(0-100) 4,6(001-0) 4,20(-0100)

8,10(010-0) 8,24(-1000)

16,18(100-0) 16,20(10-00) 16,24(10-00)

6,14(0-110) 6,22(-0110)

10,14(01-10)10,26(-1010)

12,14(011-0) 12,28(-1100)

18,26(1-010) 18,22(10-10)

20,22(101-0) 20,22(1-100)

24,26(110-0) 24,28(11-00)

14,30(-1110) 22,30(1-110) 26,30(11-10) 28,30(111-0)

**Step-3**

2,6,18,22(-0-10) 2,6,10,14( 0--10)2,10,18,26(--010)2,18,6,22(-0-10)

2,18,10,26(--010)4,12,6,14(0-1-0) 4,6,12,14 (0-1-0)

4,6,20,22(-01-0)4,20,6,22(-01-0) 4,20,12,28(--100) 8,10,12,14(01--0) 8,24,10,26(-10-0) 8,24,12,28 (-1-00)

6,14,22,30 (--110) 6,22,14,30(--110) 10,14,26,30(-1-10) 10,26,14,30(-1-10) 12,14,28,30(-11-0) 12,14,28,30(-11-0)

18,26,22,30(1--10) 18,22,26,30(1--10) 20,22,28,30(1-1-0)

20,22,22,30(1-1-0) 24,26,28,30(11--0) 24,28,26,30(11--0)

**Step-3**

2,6,18,22(-0-10)  4,6,20,22(-01-0) 

2,18,10,22(-0-10) 4,20,6,22(-01-0) 

2,10,18,26(--010) 4,12,6,14(0-1-0) 

2,18,6,22(--010)  4,6,12,14 (0-1-0) 

4,20,12,28(--100)  10,14,26,30(-1-10) 

6,14,22,30 (--110)  10,26,14,30(-1-10) 

12,14,28,30(-11-0) 18,26,22,30(1--10) 

12,14,28,30(-11-0)  18,22,26,30(1--10) 

20,22,28,30(1-1-0) 24,26,28,30(11--0) 

20,22,22,30(1-1-0) 24,28,26,30(11--0) 

6,22,14,30(--110) 

8,10,12,14(01--0) 

8,24,12,28 (-1-00)

8,24,10,26(-10-0)

**Step-4**

2,6,8,22(-0-10)  4,6,20,22(-01-0) 

2,10,18,26(--010) 4,12,6,14(0-1-0) 

4,20,12,28(--100)  10,14,26,30(-1-10) 

12,14,28,30(-11-0)  18,26,22,30(1--10) 

20,22,28,30(1-1-0)  24,26,28,30(11--0) 

6,22,14,30(--110)  8,10,12,14(01--0) 

8,24,12,28 (-1-00)  8,24,10,26(-10-0) 

**These are the prime implicants**