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Question

Q. The minterm expansion of the function $f(P, Q, R) = PQ + QR' + PR'$ is:

- (A) $m_2 + m_4 + m_6 + m_7$
- (B) $m_0 + m_1 + m_3 + m_5$
- (C) $m_0 + m_1 + m_6 + m_7$
- (D) $m_2 + m_3 + m_4 + m_5$

Solution

We compute the function for all input combinations using a truth table:

P	Q	R	PQ	QR'	PR'	$f(P, Q, R)$
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	1	0	1
0	1	1	0	0	0	0
1	0	0	0	0	1	1
1	0	1	0	0	0	0
1	1	0	1	1	1	1
1	1	1	1	0	0	1

From the truth table, $f = 1$ for the following combinations:

$$(0, 1, 0), (1, 0, 0), (1, 1, 0), (1, 1, 1) \Rightarrow \text{Minterms: } m_2, m_4, m_6, m_7$$

Hence, the correct answer is (A).