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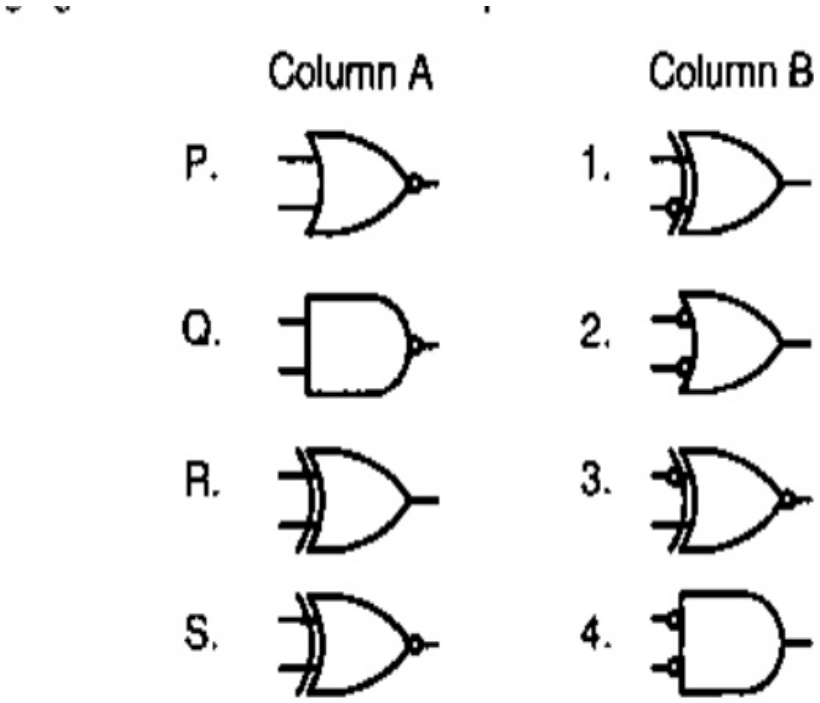
Batch: COMETFWC036
Date: 12 August 2025

GATE, EE 2010

11. Match the logic gates in **Column A** with their equivalents in **Column B.**



A P-2, Q-4, R-1, S-3

B P-4, Q-2, R-1, S-3

C P-2, Q-4, R-3, S-1

D P-4, Q-2, R-3, S-1

SOLUTION:

Let X and Y be the inputs, Z be the output for each logic gate in Column A and Column B.

The output expressions of each gate in Column A as follows:

For P - > $Z = \overline{X+Y}$

For Q - > $Z = \overline{X.Y}$

For R - > $Z = X \oplus Y$

For S - > $Z = X \odot Y$

The output expressions of each gate in Column B as follows:

For 1 - > $Z = X \oplus \bar{Y} = X.\bar{\bar{Y}} + \bar{X}.\bar{Y} = X.Y + \bar{X}.\bar{Y} = X \odot Y$

For 2 - $> Z = \bar{X} + \bar{Y} = \overline{X.Y}$

For 3 - $> Z = \bar{X} \odot Y = \bar{X}.Y + \bar{\bar{X}}.\bar{Y} = \bar{X}.Y + X.\bar{Y} = X \oplus Y$

For 4 - $> Z = \bar{X}.\bar{Y} = \overline{X + Y}$

Hence From above Expression the correct Match is **P-4, Q-2, R-3, S-1**. So the final correct option is D.

ANS: Option D