## Previous Year Problem with Solution

If two different numbers are taken from the set {0, 1, 2, 3, ..., 10}, then the probability that their sum as well as absolute difference are both multiple of 4, is

**(2017 Main)**

(a) $\frac{6}{55}$ (b) $\frac{12}{55}$ (c) $\frac{14}{45}$ (d) $\frac{7}{55}$

Total number of ways of selecting 2 different numbers from {0, 1, 2, ..., 10} $= {}^{11}C_2 = 55$

Let two numbers selected be $x$ and $y$.

Then, $x + y = 4m$ ...(i)

and $x - y = 4n$ ...(ii)

$\Rightarrow$ $2x = 4(m + n)$ and $2y = 4(m - n)$

$\Rightarrow$ $x = 2(m + n)$ and $y = 2(m - n)$

$\therefore x$ and $y$ both are even numbers.

| x | y |
|---|---|
| 0 | 4, 8 |
| 2 | 6, 10 |
| 4 | 0, 8 |
| 6 | 2, 10 |
| 8 | 0, 4 |
| 10 | 2, 6 |

$\therefore$ Required probability $= \frac{6}{55}$