④ I A.P. | II A.P.

$a = 2$ | $a' = 7$

$d = d$ | $d' = d$

$a_{10} - a'_{10} = a + 9d - a' - 9d'$

$= 2 + 9d - 7 - 9d$

$= -5$

$a_{21} - a'_{21} = a + 20d - a' - 20d'$

$= 2 + 20d - 7 - 20d$

$= -5$

$a_n - a'_n = a + (n-1)d - a' - (n-1)d'$

$= 2 + (n-1)d - 7 - (n-1)d$

$= -5$

$\therefore$ yes

⑤ 31, 28, 25, ...

$a = 31, \quad d = 28 - 31$

$= -3$

$a_n = 0$

$a + (n-1)d = 0$

$31 + (n-1)(-3) = 0$

$\Rightarrow n - 1 = \frac{-31}{-3}$

$\Rightarrow n = \frac{31}{3} + 1$

$= \frac{34}{3}$

0 is not a term of given A.P. [$\frac{34}{3}$ is not a +ve integer]

⑥ Fare after 1 km = Rs 15

Fare after 2 km = 15 + 8

= 23

Fare after 3 km = 23 + 8

= 31

15, 23, 31, ...

$a_2 - a_1 = a_3 - a_2 = 8$

$\therefore$ A.P. [False]

⑦ 400, 400, 400, ...

$\therefore$ A.P $(d = 0)$

⑦(II) 250, 300, 350, 400, ...

$d = 50 = a_2 - a_1 = a_3 - a_2 = a_4 - a_3$

$\therefore$ A.P

⑦(III) Money at end of first year = 1000 + 100

= Rs 1100

Money at end of Second year = 1100 + 100

= Rs 1200

1100, 1200, 1300, 1400, ...

$a_2 - a_1 = a_3 - a_2 = a_4 - a_3 =$ Rs 100

$\therefore$ A.P.

⑦(IV) let initial count = x

x, 2x, 4x, 8x, ...

$\because a_2 - a_1 \neq a_3 - a_2$

$\therefore$ not A.P.