Page No. : Date :

Q3 Solve the following 0/1 knapsack problem

$n = 4,\ m = 18,\ w = (3, 8, 6, 4),\ p = (9, 10, 12, 9)$

→

formula

① $f_i(y) = \max \begin{cases} f_{i-1}(y) \\ f_{i-1}(y - w_i) + p_i \end{cases}$

② $f_1(m') = p_1 \quad \text{if } (w_1 \le m')$

$= 0, \quad \text{otherwise}$

$f_1(-m') = -\infty$

$p_1 = 9,\ p_2 = 10,\ p_3 = 12,\ p_4 = 9$

$w_1 = 3,\ w_2 = 8,\ w_3 = 6,\ w_4 = 4$

$f_4(18) = \max \begin{cases} f(3)(18) \\ f_3(18-4) + 9 \end{cases}$

$= \max(31, 31)$

$= 31$

$f_3(18) = \max \begin{cases} f_2(18) \\ f_2(18-6) + 12 \end{cases}$

$= \max(19, 31)$

$= 31$

$f_3(14) = \max \begin{cases} f_2(14) \\ f_2(14-6) + 12 \end{cases}$

$= \max(19, 22)$

$= 22$

$$f_7(18) = \max \begin{cases} f_3(18) \\ f_1(18-8)+10 \end{cases}$$

$$= \max(9, 19)$$

$$= 19$$

$$f_2(12) = \max \begin{cases} f_1(12) \\ f_1(12-8)+10 \end{cases}$$

$$= \max(9, 19)$$

$$= 19$$

$$f_2(14) = \max \begin{cases} f_1(14) \\ f_2(14-8)+10 \end{cases}$$

$$= \max(9, 19)$$

$$= 19$$

$$f_2(8) = \max \begin{cases} f_1(8) \\ f_1(8-0)+10 \end{cases}$$

$$= \max(0, 10)$$

$$= 10$$

Solution vector $= \{P_4, P_3, P_2, P_1\}$

$= \{1, 1, 1, 0\}$

Total profit $= P_4 + P_3 + P_2$

$= 10 + 12 + 9$

$= 31$

weight $= w_4 + w_3 + w_2$

$= 4 + 6 + 8$

$= 18$

maximum profit for given knapsack problem is 31.