**Knapsack Problem:**

**Formal Definition:**

* **We are given with ‘n’ objects and a Knapsack(or bag) of capacity ‘m’ is given to us**
* **Associated with each object ‘i’ there is a weight ‘wi’ and profit ‘pi’ .**
* **Objective function is to fill up the bag so as to maximize the profit earned subject to the constraint that the sum of the weights of the chosen objects into the bag should not exceed the capacity of the bag.**
* **If a fraction xi (0<= xi<=1) of an object ‘i’ is chosen to include into the bag then a profit of pixi is earned.**

**Example 1:**

**Let n=3 , m=20, (p1,p2,p3) = (25,24,15) and (w1,w2,w3) = (18,15,10)**

**Feasible solutions are as follows**

**(x1, x2, x3) Ʃ wixi Ʃpixi (Strategy used)**

(1/2, 1/3, 1/4) 16.5 24.25 randomly chosen **(FS)**

1. **(1, 2/15, 0) 20 28.2 Max profit (FS)**
2. **(0 ,10/15,1) 20 31 Least weight (FS)**
3. **(0, 1, ½) 20 31.5 Descending order of pi/wi (FS)**

**(Solution 3 is optimal Solution (OS)**

**(pi/wi ) = (25/18 = 1.38 24/15= 1.6 15/10=1.5)**

**(1.6, 1.5,1.38)**

**Example 2:**

**N=7, m=15**

**(P1,P2….P7) = (10,5,15,7,6,18,3)**

**(W1,w2,….w7)=(2,3,5,7,1,4,1)**