**Chapter -17**

**Mixture and allegation**

**Alligation:** This is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of a desired price. **Mean Price:** The cost Price of a unit quantity of the mixture is called the mean price.

**Rule of Alligation:**  
**If Two ingredients are mixed in a ratio**, then  
** = **

We present it under as  
C.P.M.1 = Cost Price of First Materiel in a Mixture.  
C.P.M.2 = Cost Price of Second Materiel in a Mixture.  
C.P.M.3 = Cost Price of Mixture.  
So,  
**C.P.M.1 : C.P.M.2 = ( C.P.M.1 – C.P.M.3 ) : ( C.P.M.2 – C.P.M.3 ).**  
OR,  
(Cheaper quantity ) : ( Dearer quantity ) = ( d – m ) : ( m – c ).  
m = mean price.  
d = C.P of dearer.  
c = C.P of cheaper.

**Here is another important formula which is,**  
Consider a container contain x units, and from which we are taken out y units and replace it by water.  
After that n operation,  
the quantity of pure liquid = [ x ( 1 – y / x )n] units.  
Here is some sub link of Examples about this topic which help you better understanding.

**Example:**  
In what proportion must rice at 3.25 per kg be mixed with rice at Rs 3.80 per kg , So that the mixture be worth Rs 3.50 a kg ?  
**Answer:**  
 = 

=   
Quantity of cheaper rice / Quantity of dearer rice = 30 / 25 = 6 / 5  
**So, They must be mixed in the ratio 6: 5 .**

**Example:**  
In a What ratio Wheat at Rs. 12.30 per kg be mixed with wheat 18.30 per kg so that the mixture be worth Rs.15 per kg?  
**Answer:**  
We know that: (Cheaper quantity): (Dearer quantity)=(d – m): (m – c).

C.P.M.1=(Cost price of First material) = 12.30 = 1230  
C.P.M.2=(Cost price of Second material) = 18.30 = 1830  
M.P = (Mean price of both Material) = 1500  
So,  
(C.P.M.1 – M.P):(C.P.M.2 – M.P)= (1500 – 1230):(1500 – 1830) = 270 : 330 = 9 : 11.

**Required Ratio of both materials is 9: 11.**

**Example:**  
A goldsmith has two qualities of gold one of 14 carats and another of 17 carats purity . In what proportion should he mix both to make an ornament of 16 carats purity?  
**Answer:**  
We know that:  =   
   
=  =   
 = =   
**So , They must be mixed in the ratio 1 : 2 .**

**Example:**  
400 gm of rice solution has 30% rice in it  . How much rice should be added to make it 50% in solution?  
**Answer:**  
The already existing solution has 30% rice .  
So the other solution has 100% rice ,  
We know that:  =   
= = .  
The two mixtures added in ratio 5 : 2 .  
required rice is = 400 x = 160 gm .  
**Shortcut tricks:**  
solution    
**400** **= 160 gm .**

**Example:**  
In What ratio stone be mixed with rice so as to gain 40% by selling at C.P?  
**Answer:** Let be  
C.P of pure rice is = 1  
and S.P of mixture is = 1  
than % profit = 40%

C.P in a mix is = 1 / 140 X 100 = 5 / 7.  
here we applied alligation formula  
C.P.1 = 1(rice).  
C.P.2 = 0(stone).  
M.P(mix) = 5 / 7.  
= ( C.P.1 – M.P ):( C.P.2 – M.P ) = 2 / 7 : 5 / 7 = 2 : 5.

**So Ratio between Rice and Stone to gain 40% Profit = 2 : 5.**