# **Lagrange Multipliers**

Let, be a function of and it is connected by the relation , then

Now, equating the coefficients of and ,

# **Cobb-Douglas Production Model**

The Cobb-Douglas Production Model is

Where represents the labour and capital for a production process.

# **Application of Lagrange Multipliers in Cobb-Douglas Production Model**

**Example-1:**

Suppose, a Cobb-Douglas Production Function is given by

The cost function for a facility is given by the function

Suppose the monthly production goal is items. We can invest in tenths of units for each of these and . Determine the allocation of labour and capital to minimize the total production cost. Also unearth the minimum total production cost.

**Solution:**

Constraint:

Minimize: (Objective function)

According to the concept of Lagrange multipliers,

From ,

Substituting the in **Eq-1,**

**units**

Now, use the value of in **Eq-4**,

**units**

Finally, the minimized total cost is

**units**

**Example-2:**

Suppose, a Cobb-Douglas Production Function is given by

The cost function for a facility is given by the followings:

If the total cost invested for the production is , then determine the allocation of labour and capital to maximize the total production unit. Also unearth the maximum total production.

**Solution:**

Constraint:

Maximize:

From ,

From equation (1),

Now, use the value of in equation (4),

Now, the maximum production will be,

