Assignment-4

Team- MinTech Enthusiasts

1) To Calculate Ultimate Pit Cut off Grade

Given, Parameters & values

1. Price (P) ⟶ $38.58/g
2. Sale Price ⟶ $0.16/g
3. Concentrating Cost ⟶ $29.43/tonne
4. Mining Cost ⟶ $1.20/tonne
5. Recovery ⟶ 90%.

We know,

$$\text{Ultimate pit Cut-off Grade} = \frac{(\text{Milling/conc. cost} + \text{Mining Cost})}{(\text{Price} - \text{Marketing Cost}) \times \text{Recovery}}$$

$$= \frac{(\$29.43/\text{tonne} + \$1.20/\text{tonne})}{(\$38.58/g - \$0.16/g) \times 90/100}$$

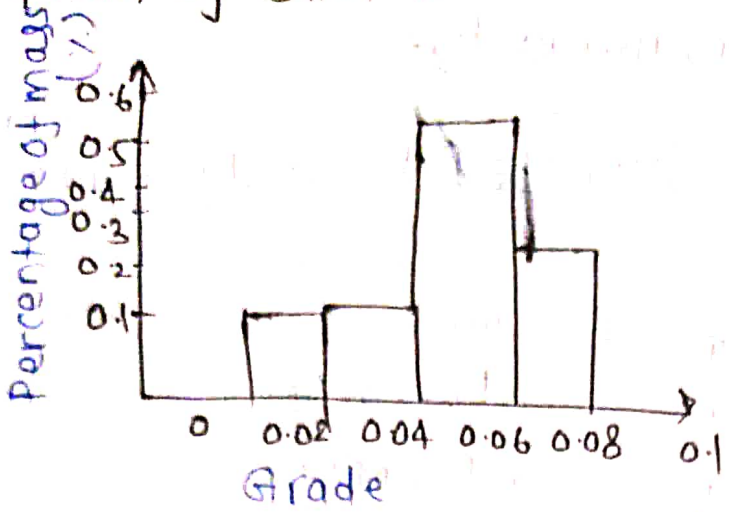
$$= \frac{\$30.63/\text{tonne}}{\$34.578/g}$$

$$= 0.88582\ g/\text{tonne}$$

So, the Ultimate pit Cut-off grade for given data is 0.88582 g/tonne.

2) Description of Graphs

a)



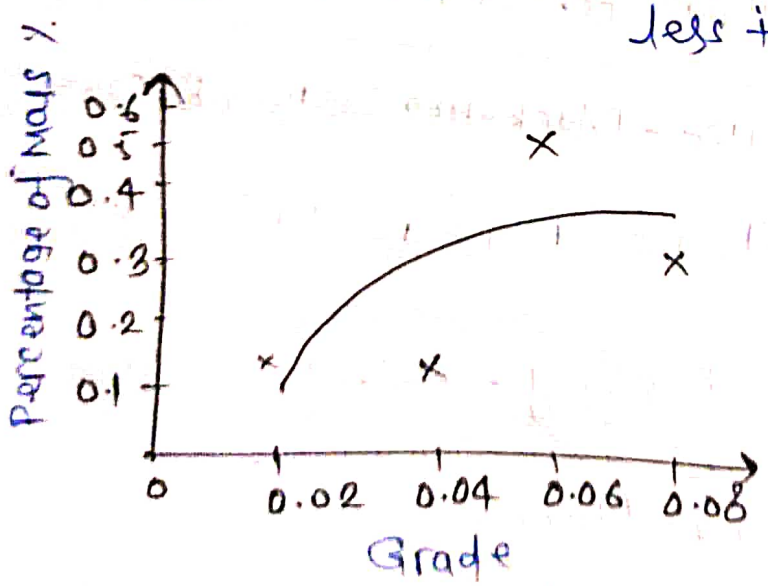
→ It is a histogram, representing the mass Percentage of ore w.r.t grade of a ore.

→ Here, we can see that between 0 - 0.02 grade the mass % is neglible.

→ Nearly (or) more than 50% ore w.r.t mass is present in betn the 0.06 - 0.08

→ So, we can say that the cut-off grade of this ore may lie in betn 0.06 - 0.08 or less in betn 0.04 - 0.06

b)



→ Here, on y-axis there is percentage of mass & the grade is on y-axis

→ The graph is a curve with two degree eq.n

→ $y = -125x^2 + 16.5x - 0.175$ $\quad R^2 = 0.5091$

Here, approximately with concept of regression the best fit curve is drawn.

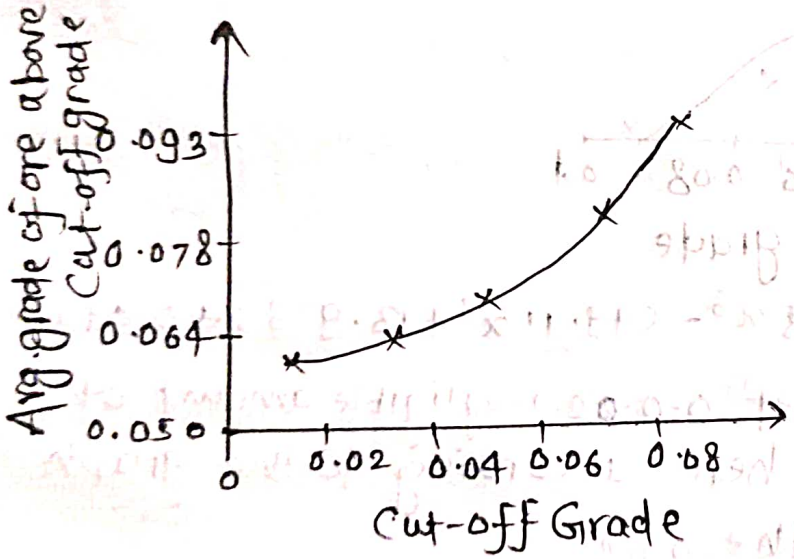
→ As from the previous graph, we said that the cut off grade may lie in bet" 0.06 - 0.08, let us check the above curve eqn by putting 0.07 in eq.n

$$y = -125 \times (0.07)^2 + 16.5 \times (0.07) - 0.175$$
$$= 0.3675 = 36.75\%$$

So, 36.75% grade is of grade 0.07

→ like this we can analyse the percentage masses of the ore

c)



→ Here the curve eqn is

$$E = -27.574x^3 + 7.2423x^2 - 0.0358x + 0.055$$

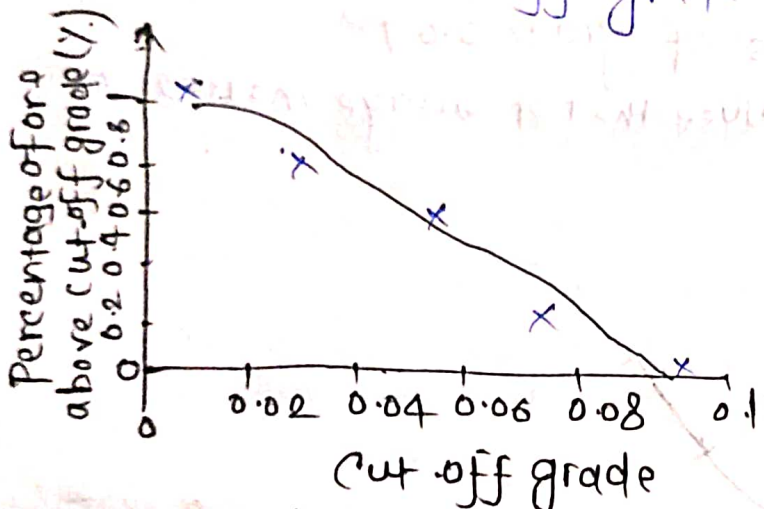
→ In this graph, we have to consider any cut-off grade randomly.

→ By considering random cutoff grade let's say 0.04 by putting this value in the curve eqn we will get a value which is the avg. cut-off grade above 0.04.

→ As we have seen that in previous graph, the optimum cut-off grade is in betn 0.06-0.08, the mass percentage of a ore is ↑ with the grade, so, lot of ore is present on higher side i.e above 0.06,

→ Due to above conclusion we can say that this graph is ↑ with the cut-off grade.

d)



→ Here the eqn is $T = 3125x^3 - 549.11x^2 + 13.973x + 0.8978$.

→ As, we know that betn 0-0.02 negligible amount of ore is present so, here according to the graph 100% ore is above the 0.02.

→ As the cut-off grade is ↑ the graph is decreasing the optimum cut-off grade is considered around 0.06

→ $T + 0.8978$

→ $T = 3125 \times (0.06)^3 - 549.11 \times (0.06)^2 + 13.973 \times 0.06 = 0.4343$

$= 3125 \times (0.05)^3 - 549.11 \times (0.05)^2 + 13.973 \times 0.05 = 0.6143$

$= 3125 \times (0.04)^3 - 549.11 \times (0.04)^2 + 13.973 \times 0.04 = 0.778144$

→ We Assumed that the optimal cut-off grade is around 0.06

→ But with this graph, we can accurately (or) with somewhat more accuracy say that 77.8144% of ore is present above 0.04 grade

So, the Cut-off grade is around 0.04.