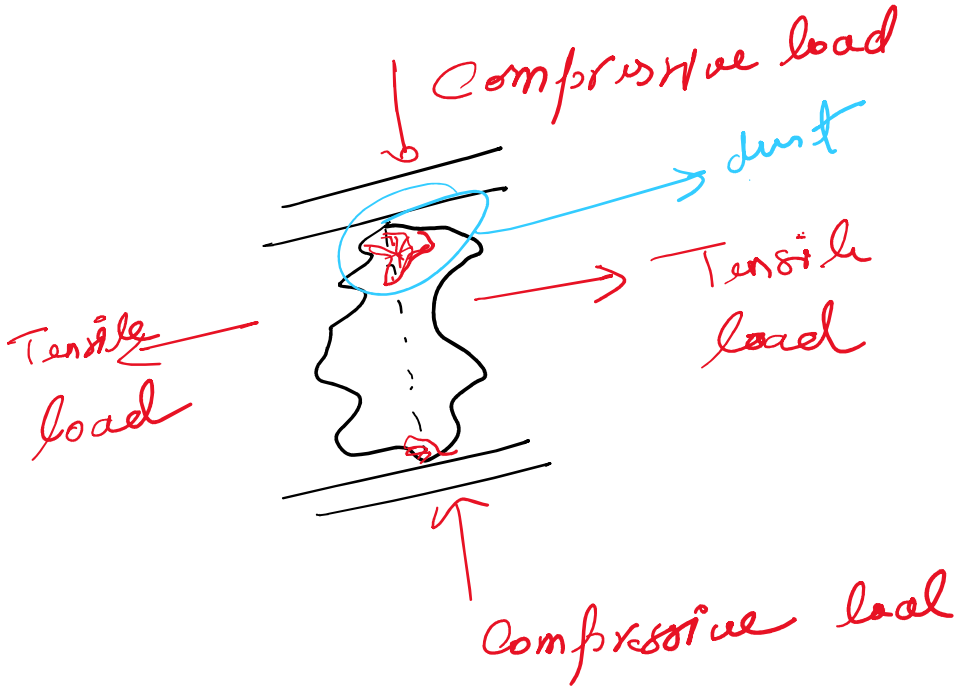
MTLR30 ASSIGNMENT – MIDSEM-2

Q1. Discuss and derive a SPECIFIC screening-efficiency expression for the outcomes of the Dust Removal

Mineral particles, also known as dust or fines, are extremely small mineral particles. Dust particles are difficult to handle and transport from one processing section to another; if we try, they will contaminate the environment, cause numerous losses in mineral processing, and also block our furnaces; therefore, it is critical that we separate them out.



The formation of fines occurs when a portion of ROM fragments due to the direct impact of compressive load during the crushing process.

Derivation for Dust Removal or fines:-

F = Feed

D = Dust particles in the feed.

B = other bigger sized particles.

$F = D + B$ (Feed consist of both dust and other bigger sized particles)

f_d ⇒ Fraction of dust in feed

d ⇒ Frac^n of dust separated out

b ⇒ Frac^n of dust gathered with big particles.

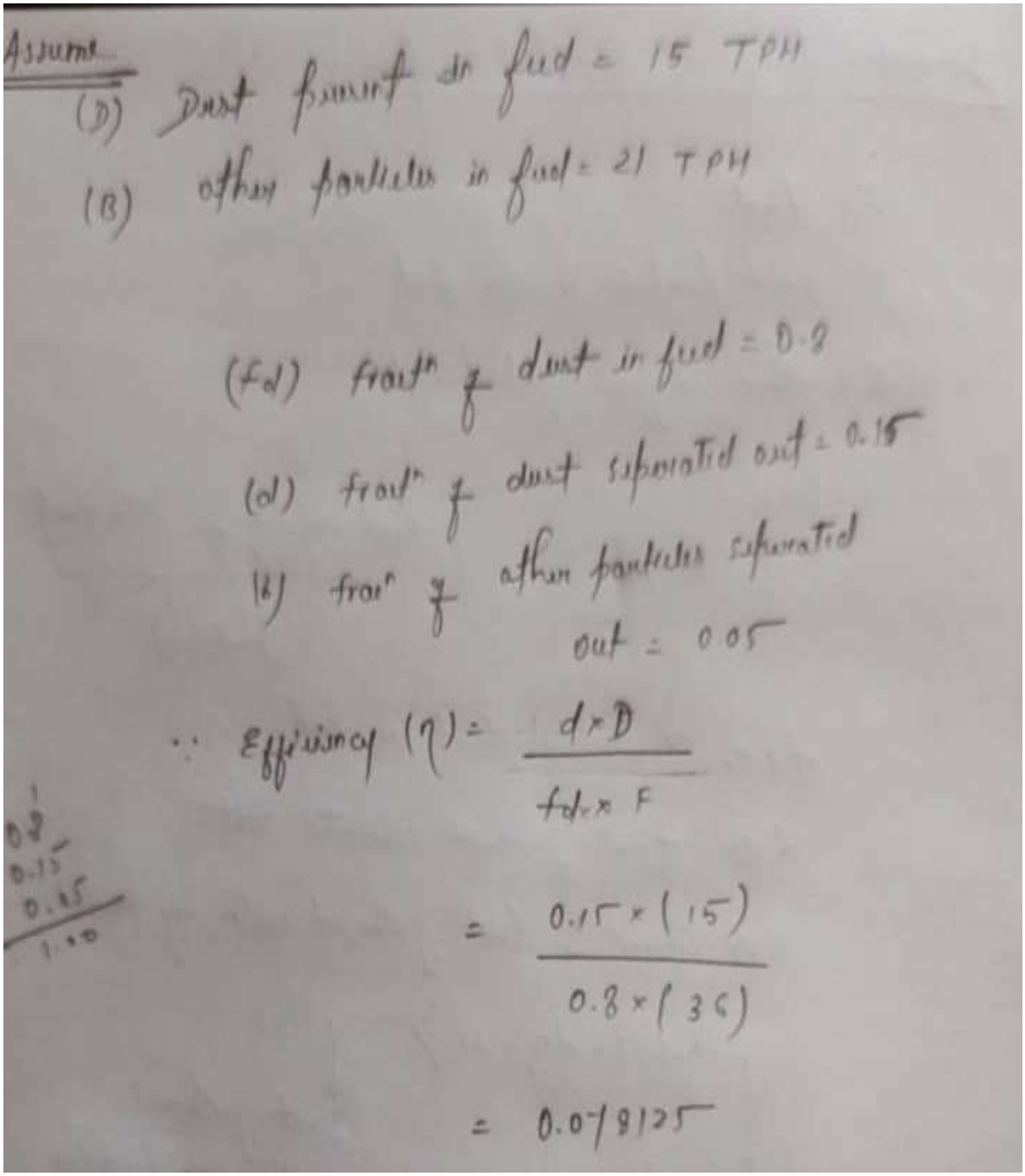
$f_d F = dD + bB$

- $f_d F$: Dust present in feed
- dD : Dust separated
- bB : Dust gathered with big particles

$$\eta = \frac{dD}{f_d F}$$

Also $$\eta = \frac{d(f_d - b)}{f_d(d - 0)}$$

Q2. Secondly, build a hypothetical screening process by assigning appropriate values to the parameters involved, and estimate its efficiency using the derived expression. Ensure that all the assumptions and descriptions of the parameters used are adequately elaborated.



Assume

(D) Dust fraction in feed = 15 TPH

(B) other particles in feed = 21 TPH

(f_d) fraction of dust in feed = 0.8

(α) fraction of dust separated out = 0.15

(β) fraction of other particles separated out = 0.05

$\therefore$ Efficiency (η) = $\frac{\alpha \times D}{f_d \times F}$

$= \frac{0.15 \times (15)}{0.8 \times (36)}$

$= 0.07\overline{8125}$

0.8
0.15
0.05
1.00