

GATE PSUs

State Engg. Exams

MADE EASY
WORKBOOK 2024



**Detailed Explanations of
Try Yourself *Questions***

Chemical Engineering
Mechanical Operation



1

Particles Characterization



Detailed Explanation of Try Yourself Questions

T1 : Solution

[Ans : (b)]

As, screen capacity $\propto \frac{1}{\text{Screen effectiveness}}$

T2 : Solution

[Ans : (d)]

For samples consisting of uniform particles these average diameters are of course all the same.

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2

Size Reduction and Separation of Solid



Detailed Explanation of Try Yourself Questions

T1 : Solution

[Ans : 0.447 kW]

Power required in ball mill is directly proportional to (Feed)^{2.5}.

Power required for feed of 1 mm size is

$$\begin{aligned} P_2 &= 25 \times \left(\frac{1}{5}\right)^{2.5} \\ &= 0.447 \text{ kW} \end{aligned}$$

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3

Particles Dynamics



Detailed Explanation of Try Yourself Questions

T1 : Solution

[Ans : 119.7 mins]

In constant pressure

$$t = K \cdot \frac{V^2}{2}$$

$$30 = K \cdot \frac{64}{2} = \frac{30}{32}$$

$$\frac{dt}{dV} = \frac{30}{32} \times 11.3$$

t = Washing time

$$= \frac{11.3}{\frac{dV}{dt}} = 11.3 \times 11.3 \times \frac{30}{32}$$

$$t = 119.7 \text{ mins}$$

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4

Mixing, Agitation and Transportation of Solid



Detailed Explanation of Try Yourself Questions

T1 : Solution

[Ans : 2415.92]

$$\text{Power} = 2415.92 \text{ W}$$

$$N_p = \frac{P}{\rho N^3 D_a^5}$$

$$\frac{P_1}{\rho_1 N_1^3 D_1^5} = \frac{P_2}{\rho_2 N_2^3 D_2^5}$$

(Another condition of dynamic similarity is that the power number of the two system will be equal) where

1 $\Rightarrow$ lab experiment

2 $\Rightarrow$ industrial vessel

$$10^{-2} \times \frac{1}{1000} \times \frac{1}{5^3} \times \frac{1}{(0.05)^5} = P_2 \times \frac{1}{900} \times \frac{1}{1^3} \times \frac{1}{(1.6)^5}$$

$$P_2 = 2415.92 \text{ W}$$

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