

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
Mid-Semester Examination 2022-23 SEM I
BITS F219 Process Engineering

Max. Marks: 20

Duration: 60 min

Date: 01.11.2022

All questions are compulsory

Q.1: Material A and material B are available in different particles size which were mixed as per the details provided in below table

	Material A	Material B
Case A	Large particles	Fines
Case B	Fines	Fines
Case c	Large particles	Large particles

Comment on the mixing efficiency and segregation in the above cases. Explain the effect of speed on the mixing process. [05]

Q.2: A) Define a) the first falling rate period and b) the equilibrium moisture content in the drying cycle. State **any two** differences between the drying phases of amorphous and crystalline substances. [1+2=3]

B) A plate-and-frame-filter press containing 20 frames is used to filter a slurry containing 10 lbs of dry solid per 100 lbs of liquid. The inside dimensions of each frame are 2ft x 2ft x 1in. the cake formed is non-compressible and contains 0.7 lbs of dry solids per lb of cake. How many lbs of solid free filtrate can be delivered before the press is filled with wet cake having a density of 90 lbs per cu ft. [2]

Q.3: Define porosity and provide the formula for the calculation of the porosity of a cylindrical tablet. What is the effect of the initial particle size of the hard material on the porosity of the tablet? Explain the relationship between radial and axial pressure during the compression and decompression cycle [05]

Q.4: Write the mechanism of particle size reduction in the fluid energy mill. Why is a fluid energy mill considered suitable for the milling of thermolabile substances? State **any two** differences between the fluid energy mill and the ball mill. Explain Rittinger's law of energy requirement of the milling process.