

B. Tech. Sem - III (Chemical Engg.) 2014 COURSE) (CBCS) :

WINTER - 2018

SUBJECT:MECHANICAL OPERATION

Day : Monday

Time : 10.00 AM TO 01.00 PM

Date : 03/12/2018

W-2018-2284

Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to right indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Assume suitable data, if necessary.

- Q.1** a) Derive the equation of screen effectiveness. (07)
b) Calculate screen effectiveness, where $X_f = 0.6$, $X_d = 0.95$ and $X_b = 0.3$. (03)

OR

- Q.1** a) Define the following terms (07)
i) Sphericity ii) Specific surface area iii) Volume surface mean diameter
iv) Mass mean diameter v) Number of particles in mixture
b) Calculate sphericity of a cylindrical particle with diameter 4cm and length 5cm. (03)

- Q.2** Describe in detail principle, working, construction, advantages of pneumatic conveyors with neat labeled diagram. (10)

OR

- Q.2** Discuss in detail (10)
i) Hoppers and silos ii) Characteristics of bulk solid

- Q.3** Explain in detail any two mixers for dry powders with neat labeled diagram (10)

OR

- Q.3** a) Explain the following terms (06)
i) Mixing index ii) Mixing and blending iii) Degree of mixing
b) What is the necessity of mixing and agitation in chemical industries? (04)

- Q.4** a) Derive the equation for stoke's law (07)
b) Explain differential settling method (03)

OR

- Q.4** a) Discuss batch settling test with diagram (07)
b) Explain gravity settling method (03)

- Q.5** Derive the relation for pressure drop through filter cake. (10)

OR

- Q.5** A plate and frame press, filtering slurry, gave a total of 10 m^3 of filter in 1600 seconds and 12 m^3 in 3200 seconds, when filtration was stopped. Estimate the washing time in seconds if 3 m^3 of wash water was used. The resistance of cloth can be neglected and constant pressure is used throughout. (10)

- Q.6** Describe the following terms (10)
i) Cyclone separator ii) Electrostatic precipitator

OR

- Q.6** Give uses of following in industry (10)
i) Mineral jig iii) Magnetic separator
ii) Scrubbers iv) Hydrocyclone

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