312342

12425
3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define Sphericity.

(b) Draw the schematic representation of the ideal screen.

(c) State any two applications of filtration in industry.

(d) State the advantage of wet scrubber in solid – gas separation operation.

(e) Draw the labelled sketch of agitated vessel.

(f) Give two examples of filter aid.

(g) List the principles of size reduction used in process industry.

2. Attempt any THREE of the following : **12**

(a) Distinguish between crushing and grinding.

(b) Why does screen efficiency decreases with increase in capacity ? Derive an expression to calculate overall effectiveness of the screen.

(c) Draw the proportionate sketch of cyclone separator.

(d) Why vortex formation is not desirable in agitated vessel ? Illustrate with sketch three methods of avoiding vortex formation.

3. Attempt any THREE of the following : **12**

(a) An application requires separation of particles from flue gas having size less than 0.5μ. Suggest suitable solid-gas separation equipment. State its working principle and constructional features.

(b) State the importance of mixing in industry. How does mixing and agitation differs ?

(c) Draw the schematic sketch of propeller and turbine impeller. State one application of each.

(d) Explain construction and working of bag filter.

4. Attempt any THREE of the following : **12**

(a) Write typical application of :

(i) Belt conveyor

(ii) Screw conveyor

(iii) Pneumatic conveyor

(iv) Bucket elevator

(b) State working principle of froth floatation. Explain stepwise procedure of solid-solid separation by the technique mentioned.

(c) Distinguish between sedimentation and filtration (any four points).

(d) Derive an expression for calculating critical speed of ball mill.

(e) What is difference between mixing action by sigma mixer and ribbon blender ? Define mixing index. What is maximum value of mixing index for free flowing solids ?

5. Attempt any TWO of the following : **12**

(a) Calculate the power required for crushing 150 tons per hour of limestone if 80% of the feed passes through 50 mm screen and 80% of the product passes through 3.125 mm screen. Work index of limestone : 12.74.

(b) Explain construction and working of vibrating screen.

(c) Explain construction and working of venturi scrubber.

6. Attempt any TWO of the following : **12**

(a) Explain laboratory batch sedimentation test.

(b) State and explain the effect of following factors on the performance of screen :

(i) Feed rate

(ii) Area available for screening

(iii) Capacity

(iv) Moisture contained in solids

(v) Inclination

(vi) Vibration, amplitude and frequency.

(c) Why crushing is most energy inefficient operation ? Write statement and mathematical expression of Rittingers law and Kick's law.
