

312342

24225

3 Hours / 70 Marks

Seat No.

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- 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) Solve questions sequentially.

Marks

1. Solve any FIVE :

5 × 2 = 10

- (a) Name the four common ways of breaking solids in size-reduction machines.
- (b) Define mesh number.
- (c) State any two advantages of rotary drum filter.
- (d) State the principle of fabric filter.
- (e) List various types of impellers.
- (f) State Rittinger's law and Kick's law.
- (g) Define filtration.

2. Solve any THREE :

3 × 4 = 12

- (a) State applications of (i) gyratory screen, (ii) froth floatation, (iii) magnetic drum separator.



- (b) Draw a schematic diagram of electrostatic precipitator. State its principle and working.
- (c) Explain in brief the construction of sigma mixer.
- (d) What is vortexing ? Explain the methods of preventing vortexing.

3. Solve any THREE :**3 × 4 = 12**

- (a) What should be the diameter of a set of rolls to take feed of size equivalent to 38 mm spheres and crush to 12.7 mm ? The co-efficient of friction is 0.35.
- (b) Differentiate between sedimentation and filtration based on (i) force of separation (ii) medium (iii) concentration of solids and (iv) discarded material.
- (c) Explain construction and working of pulse-jet fabric filter.
- (d) Draw sketches of axial flow pattern and radial flow pattern. State their significance in industrial applications.

4. Solve any THREE :**3 × 4 = 12**

- (a) Explain in brief coagulants and their role in sedimentation and filtration.
- (b) Find out critical speed of ball mill by using following data : (i) Diameter of ball mill = 450 mm (ii) Diameter of ball = 25 mm.
- (c) State the principle of magnetic drum separator. Draw it's neat labelled diagram mentioning (i) Rotating drum, (b) Divider, (c) Magnetic material, (d) Non-magnetic material.
- (d) Explain briefly deep bed filtration and cake filtration.
- (e) State principle, construction and working of Ribbon blender.

5. Solve any TWO :**2 × 6 = 12**

- (a) A certain set of crushing rolls has a rolls of 1000 mm diameter and 375 mm width face. They are set so that the crushing faces are 12.5 mm apart. The manufacturer recommends their speed to be 50 to 100 rpm. They are employed to crush a rock having specific gravity 2.35 and the angle of nip is $31^{\circ} 30'$. What is the maximum permissible size of the feed and maximum actual capacity of rolls in tonnes per hour if the actual capacity is 12% of the theoretical ?

Theoretical capacity in t/h, $Q = 4.352 \times 10^{-7} N.D.W.d.S.$

where N is rpm, D is roll dia. in mm, W (width) in mm, d (half the gap/width between roll surface) in mm and S is (specific gravity).

- (b) State and explain differential analysis alongwith suitable example in screening operation.
- (c) Draw a neat labelled sketch of Dorrr thickener. State its principle, working and applications.

6. Solve any TWO :**2 × 6 = 12**

- (a) Draw a neat labelled diagram of dilute phase pneumatic conveying system and describe its principle and working.
- (b) Explain batch sedimentation test with neat diagram.
- (c) State the mechanism of mixing in
- (i) solids (ii) liquids (iii) semi-solids
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