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3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answer with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
(7) Preferably write answer in sequential order.

Marks

1. **Attempt any FIVE of the following:** **10**
- a) Define the term ‘sphericity’.
 - b) Define screen aperture and mesh number.
 - c) Enlist any two solid-liquid separation techniques.
 - d) Write the principle working of cyclone separator.
 - e) Name the different conveyors.
 - f) State any one characteristic of propeller.
 - g) Describe crushing efficiency and write its formula.

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2. Attempt any THREE of the following: 12
- a) Differentiate between crushing and grinding.
 - b) Explain different variables affecting screening operations (any four)
 - c) Describe the laboratory scale Batch Sedimentation test.
 - d) Explain Electrostatic precipitator with principle, construction and working.
3. Attempt any THREE of the following: 12
- a) State –
 - i) Rittinger's Law
 - ii) Kick's Law
 - iii) Bond's Law
 - iv) Work Index.
 - b) A certain crusher accepts a feed material having a volume - surface mean diameter of 19 mm and gives product of volume - surface mean diameter of 5 mm. The power required to crush 15 tonnes per hour is 7.5 kw. What will be the power consumption if capacity is reduced to 12 tonnes per hour?
 - c) Derive expression for effectiveness of screen.
 - d) Explain with neat diagram, construction and working of rotary drum filter.
4. Attempt any THREE of the following: 12
- a) A pair of rolls is to take a feed equivalent to spheres 38 mm in diameter and crush them to sphere having a diameter of 12.7 mm. If coefficient of friction is 0.29. What should be the diameter of the rolls?
 - b) Compare Ideal screen with actual screen.
 - c) Draw a neat labelled diagram of plate and frame filter press.
 - d) Derive expression for constant pressure filtration and sketch graph.
 - e) Explain the construction and working of sigma mixer.

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

- a) Explain principle, construction and working of cyclone separator.
- b) With a neat sketch explain the construction and working of screw conveyor.
- c) Sketch muller mixer and write its principle, construction and working.

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

- a) Sketch continuous thickener and discuss the respective zones alongwith graph.
- b) Describe positive pressure pneumatic conveyor alongwith neat sketch.
- c) Draw the sketch and discuss flow patterns of –
 - i) Propeller mounted on centre with no baffles.
 - ii) Propeller mounted on centre with baffles, axial flow pattern.
 - iii) Turbine mounted on centre with baffles, radial flow pattern.State any one application of each.
