

17313

21819

3 Hours / 100 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) 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.

Marks

1. a) Attempt any SIX of the following: 12
- (i) List methods by which size reduction is carried out.
 - (ii) State Rittinger's law.
 - (iii) Define mesh number and cut diameter.
 - (iv) Write the criteria of Tyler standard screen.
 - (v) Draw the neat sketch of flow pattern generated by axial flow impeller.
 - (vi) Name four methods of solid- solid separation other than screening.
 - (vii) State the importance of mixing in process industry.

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- b) **Attempt any TWO of the following:** **8**
- i) Describe the classification of size reduction equipments.
 - ii) Draw the neat sketch of blake type jaw crusher. State its application.
 - iii) Derive an expression for calculating effectiveness of a screen.
2. **Attempt any FOUR of the following:** **16**
- a) State the advantages of an ideal blake jaw crusher. Name the type of size reduction to be used in following simulation:
 - (i) Stone crushing
 - (ii) Crushing of oil seeds.
 - b) Draw the series – parallel arrangement of trommel in separation of solid mixture containing 100, 120 and 200 micron particle.
 - c) A primary screening of material obtained from mine is to be carried out. Suggest suitable screen. Draw neat sketch.
 - d) With neat sketch explain working of rake classifier.
 - e) State principle and any two application of hydraulic jig.
 - f) What is mean by constant pressure filtration. State it's limitation.
3. **Attempt any FOUR of the following:** **16**
- a) Distinguish between open circuit grinding and closed circuit grinding.
 - b) Explain the effect of following parameters on performance of screen:
 - (i) Method of feed
 - (ii) Screen surface
 - (iii) Moisture content
 - (iv) Vibration, frequency

- c) What is difference between magnetic separator and magnetic concentrator? State the application of both.
- d) Describe the concept of cake and deep bed filtration.
- e) Draw the neat sketch showing various stages of filtration in rotary vacuum drum filter
- f) Describe the dependency of following parameters on the rate of filtration.
 - (i) Pressure drop across filter.
 - (ii) Viscosity of filtrate.
 - (iii) Area of filtering surface
 - (iv) Cake resistance.

4. Attempt any FOUR of the following:

16

- a) Draw the neat sketch of three deck vibrating screen. State typical application.
- b) Describe construction and working of drum type electrostatic separator.
- c) Distinguish between pressure filtration and vacuum filtration.
- d) What is filter aid? Name any two types of filter aid widely used in industry.
- e) Explain the term free settling and hindered settling.
- f) Distinguish between sedimentation and filtration.

- 5. Attempt any TWO of the following:** **16**
- a) Calculate the operating speed of a ball mill from following data:
- (i) Diameter of ball mill = 500 mm
 - (ii) Diameter of ball = 45 mm
- If operating speed is 75% less than critical speed.
Operating speed is 50% less than critical speed.
- b) State the principle of froth floatation. Explain the role of promoters, modifiers and frothing agents in floatation with e.g.
- c) Give the function of thickener. Draw the diagram of a thickener showing the different Zones in it. Explain the role of coagulants in filtration and sedimentation with eg.
- 6. Attempt any FOUR of the following:** **16**
- a) Draw the neat sketch of top driven centrifuge.
- b) Define vortex. Name three methods by which vortex formation can be avoided.
- c) State the application of sigma mixer ribbon blender.
- d) With neat sketch explain the working of Muller mixer.
- e) What is difference between kneaders and blenders? State the critical used for evaluation the performance of blender.
- f) A flat blade turbine with six blades is installed centrally in a vertical tank. The tank is 1.83 m in diameter. The tank is filled with solution of 50% caustic soda is agitated at 90 rpm. Calculate the power required to operate the mixer. Take $N_p = 5$. Density of the solution is 1.3 g/cm^3 . Diameter of turbine = 60 cm.
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