17313

13141

3 Hours / 100 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.

Marks

1. a) **Attempt any <u>SIX</u> of the following:** **12**

i) List any four names of size reduction equipments.

ii) Define unit operation with one example.

iii) State Kick's law with mathematical statement.

iv) Define crushing efficiency.

v) Name the three flow patterns generated in an agitated vessel.

vi) Define mesh.

vii) State principle of electrostatic separation.

viii) State with one example, define homogenous mixture.

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

i) Derive an expression for calculating critical speed of a ball mill.

ii) Give different types of size reduction equipment based on their performance and state factors for selection of the equipment.

iii) Discuss the factors mention below affecting the performance of screen:

1) Method of feeding

2) Screen slope.

2. Attempt any <u>FOUR</u> of the following: **16**

a) State the following laws with their mathematical equation:

i) Rittenger's law

ii) Bond's law

b) Draw neat sketches of various trommels arrangement.

c) Explain with neat sketch working of grizzly screen.

d) Explain working principle of gravity settling tank with a neat labelled diagram.

e) Explain principle and construction of an cyclone separator with a neat labelled diagram.

f) Describe the principle of cake filtration.

Marks

3. Attempt any FOUR of the following: **16**

a) Discuss working principle and construction jew crusher.

b) Write the equation for overall material balance, based on oversize and undersize particle for a screening operation.

c) Discuss in detail the characteristics of filter medium used in filtration operation.

d) Discuss with neat sketch construction of top suspended basket centrifuge.

e) Discuss the effect of pressure drop on filteration.

f) Explain working of rapid sand filter.

4. Attempt any FOUR of the following: **16**

a) Explain with neat sketch construction of vibrating screen.

b) Discuss the operation for separating of solid particles based on magnetic properties.

c) What do you mean by 1-2-3-2-1-2-3-2---- in filtration equipment.

d) Define concept of filtration and discuss classification of filteration and filters on basis of:

i) Driving force

ii) Filtration mechanism.

e) Define hindered settling. Draw a sketch of settling zones in continous thickner.

f) Compare sedimentation and filtration on the basis of:

i) Principle

ii) Driving force

iii) Concentration of solids

iv) Equipments used.

Marks

5. Attempt any TWO of the following: **16**

a) Calculate the operating speed of the ball mill from the data given below:

Diameter of ball mill = 800 mm

Diameter of ball = 60 mm

If i) Operating speed is 55% less than the critical speed.

ii) Critical speed is 40% more than the operating speed.

b) Explain working principle of froath floatation. Give the principle of operation and discuss role of promoters, modifiers and froathing agent in froath floatation operation.

c) Discuss in detail laboratory batch sedimentation test.

6. Attempt any FOUR of the following: **16**

a) Discuss any four factors of filteration affecting rate of filtration.

b) Sketch the following:

i) Disk flat blade turbine impeller.

ii) Combined anchor and gate paddle agitator.

c) Discuss the types of flow pattern of impellers.

d) Describe with neat labelled diagram muller mixer.

e) Sketch the blades used for double arm kneaders and gives its application:

i) Sigma

ii) Double-naben blade

f) A six blade turbine agitator of diameter 60 cm is installed centrally in tank with flat bottom of diameter 180 cm, at a height of 60 cm from the bottom. The tank is filled with a solution of viscosity 0.10 poise and 1.45 gm/cm^3 density. The speed of agitation is 90 r.p.m. The tank is baffled. Calculate the power required.

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