



17313

21415

3 Hours/100 Marks

Seat No.

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- Instructions :** (1) **All** questions are **compulsory**.
(2) Illustrate your answers 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**.
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MARKS

1. A) Attempt **any six** of the following :

12

- a) Define crushing efficiency.
- b) Define Rittinger's law.
- c) Define mesh and screen aperture.
- d) Give equation of the overall material balance for a screen.
- e) Give types of impellers.
- f) Name the method used for the separation of solids based on :
 - i) Specific gravity
 - ii) Surface properties of material.
- g) State the principle of electrostatic separation.
- h) Define agitation and mixing.

B) Attempt **any two** of the following :

8

- a) Explain closed circuit grinding with the help of a diagram.
- b) Define angle of nip and state equation for angle of nip.
- c) Derive the equation for finding the overall effectiveness of screen.

P.T.O.

**MARKS**

2. Attempt **any four** of the following : **16**
- a) Define work index. Write the formula and explain the terms.
 - b) Draw the various trommel arrangement for separating particles of 50 mesh, 100 mesh and 150 mesh.
 - c) Explain the construction of grizzlies.
 - d) Define classification. State the laws of classification.
 - e) State, cyclone separator is used to separate solids dispersed in air. Draw the neat labelled diagram of a cyclone separator.
 - f) Define constant rate and constant pressure filtration.
3. Attempt **any four** of the following : **16**
- a) State the principle of hammer mill. Draw a neat sketch and label it.
 - b) State the factors affecting the performance of screen.
 - c) State the classification of solids based on the magnetic properties and define tramp iron.
 - d) Filters are neither operated under constant pressure nor under constant rate throughout the filtration. Give reason.
 - e) For filtering hot liquids, which filter you will prefer-vacuum filter or pressure filter. Give reason.
 - f) Draw the diagram of a top suspended basket centrifuge and mark the parts.
4. Attempt **any four** of the following : **16**
- a) Distinguish between grizzlies and vibrating screen based on following points :
 - i) Motion imparted to screening surface.
 - ii) Number of screening surface in one assembly.
 - iii) Material of construction of screening surface and arrangement.
 - iv) Application.



- b) Explain the working of Ball Norton machine.
- c) Explain the working of pressure sand filter with the help of a diagram.
- d) Give the classification of filters based on :
 - i) Function
 - ii) Driving force.
- e) Define free settling and hindered settling. Explain effect of free settling on particle separation.
- f) Distinguish between sedimentation and centrifugation on the basis of
 - i) Principle
 - ii) Application
 - iii) Space required
 - iv) Equipment used.

5. Attempt **any two** of the following :

16

- a) Derive the equation for finding the critical speed of a ball mill.
- b) State the principle of froth floatation. Explain the role of collectors, modifiers and frothers in froth floatation with eg.
- c) Give any two functions of thickener. Explain the role of coagulants in filtration. Give eg. of two coagulants.

6. Attempt **any four** of the following :

16

- a) Discuss the formula to calculate filter medium resistance and cake resistance in a filtration. Explain the terms used.
- b) List any two methods adopted to prevent vortex formation.
- c) Define mixing index. Write the formula to calculate mixing index.

**MARKS**

- d) Name the mixer used for coating granular solids with a small amount of liquid. Explain its construction.
- e) Explain construction and working of sigma mixer.
- f) A turbine type impeller of 40 cm in diameter is installed in a 2 m diameter vessel filled with a liquid solution upto 1.5 m. The impeller is operating at a speed of 100 rpm. Density of liquid solution is 15 kg/m^3 and viscosity of the solution is 10 cp. Power number is given as 9. Calculate the power required.
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