(3 HOURS)   (MAX. MARKS: 80)

Note:

1. Question No. 1 is compulsory.
2. Attempt any three questions out of remaining five questions.
3. Assume suitable data wherever necessary.
4. Figures to right indicate full marks.

Q.1 Answer the following (Any four)   20

a. Water is flowing through a pipe having diameter 30 cm and 15 cm at the bottom and upper end respectively. The intensity of pressure at the bottom and upper end is 29.43 N/cm^2 and 14.715 N/cm^2 respectively. Determine the difference in datum head if the rate of flow through pipe is 50 lit/s.

b. What are the factors that influence the size of product in ball mill?

c. Explain briefly cavitation & priming of centrifugal pump.

d. Explain the type of impellers.

e. Write a note on trommels.

Q.2 a. Explain Pascal's law and derive mathematical expression for the same.   10

b. What is screen effectiveness? Derive mathematical expression for the same.   10

Q.3 a. The rate of flow of water through a horizontal pipe is 0.3 m^3/s. The diameter of pipe is suddenly enlarged from 250 mm to 500 mm. The pressure intensity in the smaller pipe is 13.734 N/cm^2. Determine (i) loss of head due to sudden enlargement and (ii) pressure intensity in large pipe.

b. Water is flowing through a pipe AB (D = 1 m) at 3 m/s and continues through the pipe   10
BC (D = 1.2 m). At point C, pipe BC branches. Branch pipe CD (D = 0.8 m) carries one third of flow in pipe AB. The flow velocity in branch pipe CE is 2.5m/s. Find (i) volumetric flow rate in pipe AB, (ii) velocity in pipe BC, (iii) velocity in pipe CD and (iv) diameter of pipe CE.

Q.4 a. Derive all three laws of size reduction starting from a common expression.   10

b. Derive expression for constant rate and constant pressure filtration.   10

Q.5 a. Find the type of flow of an oil having specific gravity 0.9 and dynamic viscosity 20 Poise,   06
flowing through a pipe of diameter 20 cm and giving a discharge of 10 lit/s.

b. A certain crusher accepts a feed of rock having volume-surface mean diameter 0.75 inches   06
and discharges product of diameter 0.20 inches. The power required to crush 15 T/hr is

[P.T.O]