Answer any five questions from the following:

Q1. Explain Bernoulli's theorem in fluid flow. Describe and compare Orifice meter and Venturi meter in fluid flow operation.   **[Marks: 7+8]**

Q2. The screen analysis is shown in following table for a sample of crushed material of density 1.4 gm/cc, and sphericity factor of 0.8 (φ_s). For the material between mesh size 10 to 200 of particle size,(i) calculate Specific Surface Area ,A_w in sq cm /gram and Volume Mean Diameter in cm[$\bar{D}v$], (ii) **Plot Average particle size** against **Cumulative oversize** on a mm graph paper.

Mesh size	Pore opening, μm	Weight retained on sieves, gm
10	1651	0.0
20	833	20
35	417	100
65	208	120
100	147	104
150	104	40
200	74	16

[Marks 15]

Q3. Write short notes on **any three** of the following:

(a)Turbine design, (b) Effects of shape factors on N_p, (c) Calculation of heat duty,
(d) Classification of dryers, (e) Operation of Hammer mill, (f) Manometer and its application.
          [Marks 5x3]

Q4. (i)Define Filtration and Clarification. (ii)Discuss the terms used in filtration (Filter cake; Filtrate; Filter medium; Slurry). What are the mechanisms of filtration (Describe in details).
OR
(i)Define Filtration and Clarification. (ii)Write on the working, use, and advantages of the Rotary drum filter with a clear diagram.   **[Marks 2+(6+7)]**

Q5. (i)Mention construction and working of Flash distillation. (ii)Draw boiling point-composition diagram and mention its importance.
OR
(i)Mention construction and working of Fractional distillation. (ii)Draw vapor pressure-composition diagram and mention its importance.   **[Marks 7.5+7.5]**

Q6. (i)A layer of brick (6 inch thick) is used as layer of thermal insulation in a wall. The temperature at the hot side is 180°F and the temperature at cold side is 40°F. Thermal conductivity of the Wall is 0.026 BTU/ft.h°F. What is the rate of heat flow through the wall in BTU/hour? The area of the wall is 25 ft².
(ii)Write on Fourier's law,(iii)How double pipe heat exchanger works(explain it with diagram).
          [Marks 7+3+5]