

B.E (FT)-MBA 2ND YR)_MECHANICAL OPERATIONS_17TH JAN 2022

Attempt all questions.

**MID SEMESTOR EXAM-2
MECHANICAL OPERATIONS (B.E. F.T and B.E CHEM+MBA) 3rd
Sem**

**Time Allowed: 60 min
Max Marks: 25**

- Q.1 Derive an expression to determine terminal velocity, along with the limiting cases, of a spherical particle falling in a liquid under gravitation force. Write the differences between Stoke's and Newton's law in regard with their applicability. CO4 (7)
- Q.2 Derive Ergun's equation for fluidization and derive expression for minimum fluidization velocity. Using that expression calculate the minimum fluidization velocity, using water at 20 °C, for a bed of ion-exchange beads, 8 ft deep, to be backwashed with water to remove dirt. The particles have a density of 1.24 g/cm³ and average size of 1.1 mm. The beads are spherical. Take $\epsilon_M = 0.40$ (Given $\mu = 0.01$ P, $m = 3.9$) CO5 (10)
- Q.3 Describe the various flow patterns in agitated vessels. Explain the standard turbine design and derive the expression for Power Number. CO6 (8)