Dr. Rahul Sahu (Chem. Dept.) (197)

Roll no. .....

राष्ट्रीय प्रौद्योगिकी संस्थान, हमीरपुर

National Institute of Technology, Hamirpur

B. Tech. (Chemical Engineering) – 3rd Semester

End Semester Examination (November, 2022)

CH – 214 Mechanical Operation

Duration: 3 Hours **Marks: 50**

Note

- *Attempt all questions.*
- *Wherever necessary, draw diagram and label properly to explain the concept.*
- ***If any additional data/information are required kindly assume it***

Q1. Answer the following questions **(10 Marks)**

a) Filtration Mechanisms
b) Mixing and Agitation
c) Gravity Settling Classifier
d) Mesh Number and Hindered Settling
e) Entrainment and Elutriation

Q2. A sample of materials is crushed in a Blake jaw crusher such that the average size of the particles is reduced from 50 mm to 10 mm with the energy consumption of 3.61 kWh/tonne. Determine the consumption of energy to crush the same material of 75 mm average size to an average size of 25 mm using Rittinger's and Kick's laws. **(10 Marks)**

Q3. Explain fluidization with various kinds of contacting of batch of solids by fluids with proper diagram. Also, explain the pressure drop curve as function of Reynolds number mentioning all the major equations involved **(10 Marks)**

Q4. Explain sedimentation theory (particle dynamics) when particles in settling in a fluid with diagram and force equations involved. Also, explain the different regions encountered during settling as a function of Reynolds number. **(8 Marks)**

Q5. A sand mixture was screened through a standard 12 mesh screen. The mass fraction of the oversize material in feed, overflow, and underflow were found to be 0.4, 0.8 and 0.2 respectively. Calculate the screen effectiveness based on the oversize materials. **(4 Marks)**

Q6. What are impellers and explain different types of mechanical impellers. What do you mean by conveyors and explain different types of conveyers with detail diagram. **(8 Marks)**

----------End of Question Paper----------