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Total Number of Pages : 02

B.Tech
PCCH4204

4th Semester Back Examination 2018-19
MECHANICAL OPERATION
BRANCH : CHEM
Time : 3 Hours
Max Marks : 70
Q.CODE : F849

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions : (2 x 10)**
- a) Is sphericity independent of particle size? Justify your answer with proper explanation.
 - b) Name a few materials for which pipe transport is used.
 - c) Name the forces responsible for coagulation.
 - d) Differentiate between free and hindered settling.
 - e) Why are idlers used in belt conveyors?
 - f) What are dynamic and static angle of repose?
 - g) Mention the factors affecting the size reduction operation.
 - h) What do you understand by Stoke's law region?
 - i) Find the shape factor of a cylinder of 4mm diameter and 4mm length.
 - j) What is specific cake resistance? Mention its importance.
- Q2**
- a) Discuss the construction, working, advantages and disadvantages of a screw conveyor. **(5)**
 - b) Discuss the construction and working of a venture scrubber. **(5)**
- Q3**
- a) Write the effect of feed rate on screen effectiveness and mention the factors affecting the screen effectiveness and capacity. **(5)**
 - b) Discuss various average particle sizes used to represent the particle size of a mixture. **(5)**
- Q4**
- a) Briefly discuss the construction and operation of a gravity settling classifier with a neat diagram. **(5)**
 - b) Mention the range of applicability of the three crushing laws. Discuss the types of cake filtration. **(5)**
- Q5**
- a) How are the total surface area and the number of particles in a given sample of uniform size and density determined? **(5)**
 - b) What are recovery and rejection? Based on these derive the expression for screen effectiveness. Also discuss the effect of feed rate on screen effectiveness. **(5)**

Q6 A sludge filtered in a washing plate and frame filter press is of such nature that the filtration equation is $V^2 = K t$ where V is the volume of filtrate obtained in time t, when the pressure is constant. 30m³ of filtrate is produced in 10 hours. 3m³ of wash water is forced through the cake at the end of filtration. **(10)**

- a) What is the length of the washing time?
- b) If the filtering surface of the press is doubled, all other conditions remaining constant, how long would it take to produce 30 m³ of filtrate?

Q7 a) Discuss the factors affecting the size of the product in ball mills. **(10)**
b) For continuous filtration, along with the assumptions derive the equation for amount of dry cake produced (WC) per minute.

Q8 Write short answer on any TWO : **(5 x 2)**

- a) Discuss in detail the theory of vibrational separation with neat diagrams.
- b) Describe the operation of an induced roll magnetic separator with a neat diagram.
- c) Briefly discuss about the construction and operation of the "Electrostatic precipitator" equipment with their neat diagram.