

BACHELOR OF CHEMICAL ENGINEERING EXAMINATION, 2018**(3rd Year, 1st Semester)****CHEMICAL TECHNOLOGY - I**

Time: Three hours

Full Marks: 100
(50 marks for each part)**Use a separate Answer-script for each part****PART I**

Answer any 5 questions

1. (a) How does aeration work?
(b) Why steam is used as a purge gas in the pressure deaeration for preparation of boiler feed water?
(c) Briefly discuss the coke tray aerator with diagram. 2+3+5=10

2. (a) What is the chemistry of precipitation softening?
(b) What are the limitations of soda lime process?
(c) Briefly explain the cold lime softening. 2+3+5=10

3. (a) Classify the ion-exchanger resins.
(b) What are the advantages and limitations of sodium-cation-exchange softeners?
(c) Briefly discuss the strong acid cation (SAC) and strong base anion (SBA) resins. 1+4+5=10

4. (a) What are the different types of portland cement?
(b) Write the different constituents of portland and high alumina cement.
(c) Briefly explain the portland cement production with flow-sheet diagram. 1+2+7=10

5. (a) What do you mean by prilling?
(b) How does bi-uret formation avoid during urea production?
(c) Draw the flow-sheet diagram for urea manufacture from ammonium carbamate. 1+2+7=10

6. (a) Classify the Soda-Ash production processes.
(b) Briefly explain the ammonia recovery and recycle in Soda-Ash production by Solvay process.
(c) Draw the flow-sheet diagram of Soda-Ash production by Solvay process. 1+2+7=10

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1. Water collected from rainwater harvesting is proposed to be used as cooling-tower water. What pre-treatments are necessary?
2. Problems of biological fouling occur with cooling tower water and not boiler-feed water — why?
3. Acidic mists are formed if SO₃ is directly dissolved in water. How such mist is formed?
4. In Mannheim process, hydrogen chloride gas is first cooled and then is allowed to flow upward through a packed tower — why these two steps are necessary?
5. Nitric acid manufacturing process by ammonia oxidation is basically a three step process. Should it be operated under pressure or not? Give reasoning.
6. Why weak brine from the anolyte chamber (in a chlor-alkali membrane cell) has to be dechlorinated before recycling and how is it done?
7. How paper is made from pulp?
8. What is the function of the suspension preheater and pre-calciner in a cement kiln?
9. Dye is required to make pigment or pigment is required to make dye — which statement is true? Justify.
10. Triple superphosphate is produced by granulation and not by prilling — why?
11. In steam reforming of hydrocarbons for the urea plant, what is the justification of a secondary reformer?