

BACHELOR OF CHEMICAL ENGINEERING EXAMINATION, 2019

(THIRD YEAR, FIRST 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 TEN questions

10×5

1. Scaling and corrosion are two common phenomena encountered with heat-exchange equipment. Why do they occur?
2. What are the advantages and disadvantages of using chlorine as biocide in cooling-tower water treatment?
3. The ion-exchange section preparing water for feeding super-critical boilers consists of strong acid cation resin bed followed by aerator and then strong base anion resin bed. Why?
4. Why deaeration is necessary for boiler-feed water and not for process water? Steam-stripping serves the purpose — how?
5. Gas filtration is necessary before the SO₂ to SO₃ converter stage. Why and what are the sources of fines in the gas?
6. What are the potential pollutants which may be present in the tail gases coming out of the absorption tower of a sulphuric acid plant? What is the reason of the presence of such pollutants and what are the remedial measures to check it?
7. Under which circumstances NO_x emissions can increase in a nitric acid plant? What is the principle of catalytic reduction process (often termed catalytic oxidation or incineration)?
8. How the 'fixed' and 'free' ammonia are recovered in the Solvay soda-ash process?
9. How the hot and moist chlorine gas coming out of the anolyte chamber of the Membrane cell is converted into liquid chlorine?
10. Why oxygen delignification is necessary in pulp production? How is it done?
11. In ammonium phosphate manufacture how the heat of neutralization of phosphoric acid with ammonia is taken care of?

[Turn over

Part-II

Answer all questions

1. (a) What are the limitations of aeration?
(b) Briefly discuss the weak acid cation (WAC) and weak base anion (WBA) resins.
(c) Briefly discuss the forced draft aerator with diagram. **2+4+4=10**

2. (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+3+6=10**

3. (a) What do you mean by prilling?
(b) What are the different consumption patterns of urea?
(c) Briefly explain the production of urea from ammonium carbamate and draw the process flow sheet diagram. **1+1+8=10**

4. (a) What are the code, chemical formula and type of cement?
(b) What are the Pozzolana and magnesium oxychloride?
(c) Briefly explain the portland cement production with flow-sheet diagram. **2+2+6=10**

5. (a) What is pulp?
(b) Explain the bleaching of pulp.
(c) Draw the flow sheet diagram for preparation of wood pulp by sulfate process. **1+3+6=10**