Exam Date & Time: 31-May-2023 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

B.Tech. IV Semester End Semester Examination, May - June 2023

CHEMICAL PROCESS INDUSTRIES [CHE 2252]

Marks: 50 **Duration: 180 mins.**

Descriptive Questions

Answer all the questions. Section Duration: 180 mins

1) Explain at what conditions and how the liquefaction of permanent gases (O_2 and N_2) occurs. (3)

A)

B) Summarize the Solvay process and list the products and by-products obtained from it. (3)

C) Electrolysis of a pure brine solution produces caustic soda. Outline the manufacturing process with a neat PFD, reactions and other by-products. Also, analyse and suggest method(s) to improve the strength of caustic soda produced. (4)

2) In the petroleum refinery, the off gas generated during the desulfurization of sour natural gas contains significant amount of H_2S and some flue gases. It is desired to produce elemental sulphur utilizing this off gas. Recommend a process route in the form of a PFD along with an explanation (5)

A)

B) Identify four important industrial uses of sulfuric acid (2)

C) Analyse the effect of temperature and pressure on the yield of NH3 in Haber's process. With a neat flow diagram, explain the manufacturing process of Ammonia by Haber's process (3)

3) Name any two fertilizer products which are prepared using ammonia. Describe briefly the "Prilling tower" and its role in the fertilizer industry. (3)

A)

B) Name the different methods for the extraction of oils and compare them based on the yield of oil, product (oil) quality, and operating conditions (3)

C) Explain with a neat PFD, the method of preparing pulp through the Kraft/Sulfate process. (4)

4) What are surfactants? Differentiate with examples (3)

A)

B) Recommend two additives/constituents and explain their role in removing impurities from sugarcane juice during the production of sugar? (2)

C) What are the different pre-treatment methods for cellulosic materials for the production of ethanol? Recommend a process flow diagram for production of ethanol from any starchy material (5)

5) Explain with a neat flow diagram the various unit operations and unit processes involved in the production of starch from maize (4)

A)

B) Explain the process of Vulcanization of rubber. (3)

C) Differentiate between Nylon 6, Nylon 66 and viscous rayon (3)

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