

**[Time : 3 Hours]**

**[ Marks : 60 ]**

Please check whether you have got the right question paper.

- N.B:**
1. **All** questions are **compulsory**.
  2. **Figures** to the right **indicate marks**.
  3. Draw **flow sheet diagrams** of **pumps** and **equivalents** wherever **necessary**.

1. (a) What is a boiler? Name the two types of boiler. **2**  

**OR**

 (a) What are the criteria for selection of a brine? **2**  
 (b) Give the advantages and applications of diagram pump. **2**  

**OR**

 (b) Name the three elements necessary for the operation of reciprocating pump. **2**  
 (c) Mention any two uses of caustic soda. **1**  

**OR**

 (c) Write the materials required for the preparation of phosphorous oxychloride. **1**  
 (d) What are zeolites? **1**  

**OR**

 (d) Write the balanced chemical equation for the manufacture of ferrous sulphate heptahydrate. **1**  
 (e) Draw a neat diagram of phylosilicate. **1**  
 (f) Define pump. **1**  
 (g) Write any four uses of sodium dichromate. **2**  
 (h) Give the physical properties of potassium permanganate. **2**
  
2. Attempt **any four** of the following : **12**
  - (a) Explain the steps involved in the manufacture of water glass.
  - (b) What is the composition of Dowtherm A? How does it decompose?
  - (c) Define Glass. Give the composition and application of soda lime glass.
  - (d) Distinguish between heavy chemicals and fine chemicals.
  - (e) Explain the structure of borosilicates.
  - (f) Why water used for boiler requires treatment? Explain any two methods of internal treatment.
  
3. Attempt **any four** of the following : **12**
  - (a) What are the advantages of centrifugal pump over reciprocating pumps?
  - (b) Describe the construction and working of submersible pump.
  - (c) Explain spherical storage vessels with a suitable diagram. What are its advantages?
  - (d) Describe the construction and working of a gear pump (No diagram expected).
  - (e) Write a note on catalytic reactor.
  - (f) Define head of a pump. Distinguish between plunger and piston.
  - (g) Describe the working of a double acting piston pump with a neat labelled diagram.

**TURN OVER**

4. Attempt **any four** of the following : 12
- How is nitric acid concentrated? Give any two of its applications.
  - With the help of flow sheet diagram, describe the process of manufacture of hydrogen fluoride.
  - Describe the process of manufacture of phosphorous oxychloride.
  - Draw a neat labelled diagram of membrane cell and give the cell reactions.
  - Describe only the process involved in the manufacture of sodium dichromate with balanced chemical equation (No flow sheet diagram expected).
  - Give a brief account of economic aspects of chromium trioxide and mention its two properties.
5. Attempt **any four** of the following : 12
- Describe the prilling process for the manufacture of ammonium nitrate.
  - What are the important applications of composite materials?
  - Give any three properties each of acetylene and hydrogen.
  - What is normal superphosphate? How is it prepared?
  - What are the advantages of zeolites over homogenous catalyst?
  - Explain 'Sandwich Panel' with a suitable example.