BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SCIENCE AND ENGINEERING
DEPARTMENT OF CHEMISTRY

HBSc Chemical Technology: Part 1.1

Course Code: CH115 Industrial Chemistry I

Duration: 2 Hours

OCT 2024

ANSWER QUESTION ONE AND ANY TWO FROM SECTION A AND ANY TWO FROM SECTION B. EACH QUESTION CARRIES TWENTY MARKS.

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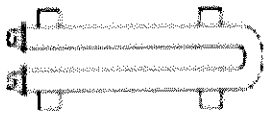
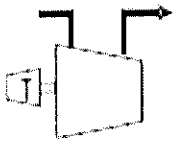
Q1 a) What are chemical industrial processes? Give two examples. **[5 Marks]**

b) The following are common chemical process symbols. What is the meaning of these process symbols?



i.

ii.



iii.

[6 Marks]

c) Write a chemical reaction equation to illustrate the production of superphosphate. **[4 Marks]**

d) Draw a well-labeled process flow diagram for the industrial production of calcium carbide. **[5 Marks]**

SECTION A: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

Q2 a) What are industrial gases? Give any three examples other than those already mentioned. **[5 Marks]**

b) With the help of a process flow diagram, explain the industrial production of oxygen using the pressure swing adsorption (PSA) technology. **[8 Marks]**

c) Explain the production of hydrogen chloride, starting with brine water as the raw material. **[7 Marks]**

Q3 a) Why are some minerals mined and others not? **[4 Marks]**

b) What are the three steps involved in the extraction of metals? **[6 Marks]**

c) Explain the effect of reactivity on the method of metal extraction. **[6 Marks]**

d) What is the chemical structure of the following mineral ores? **[4 Marks]**

i. Haematite

ii. Magnetite

iii. Bauxite

iv. Pentlandite

[1x4 Marks]

Q4 a) Explain the pyrometallurgical approach for the extraction of nickel. **[6 Marks]**

b) With the help of appropriate reaction describe the Mond Process for the production of high purity nickel. **[9 Marks]**

c) What are the advantages and disadvantage of nickel over other metals? **[5 Marks]**

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

Q5 a) Give examples of any two major copper minerals. **[2 Marks]**

b) Explain with the help of reaction equations where appropriate, the following steps for the extraction of copper from copper pyrites.

i. Ore concentration **[3 Marks]**

ii. Roasting of concentrate **[6 Marks]**

iii. Smelting process **[5 Marks]**

iv. Bessemerisation. **[4 Marks]**

Q6 a) Describe the broad classification of raw materials for the manufacture of cement. **[3 Marks]**

b) Describe the drive process for the manufacture of Portland cement. **[9 marks]**

c) Compare the Wet and Dry processes for the manufacture of cement. **[8 Marks]**

Q7 a) What is pollution and how can it be classified? **[4 Marks]**

b) Explain the causes and effects of eutrophication. **[6 Marks]**

c) Give examples of any four dirty dozen chemicals. **[4 Marks]**

d) Explain with the help of appropriate reaction equations, the removal of phosphorus from effluent water. **[6 Marks]**

END OF EXAM