

Total No. of printed pages = 5

END SEMESTER EXAMINATION – 2022

Semester : 4th

Branch : Chemical Engineering

Subject Code : Ch-402

INDUSTRIAL CHEMICAL PROCESS – I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×5=5
 - (a) Unit process is _____ conversion leading to synthesis of various useful products.
 - (b) Hardness of water is of _____ types.

[Turn over

(c) The yield % of sulphuric acid for contact process is _____.

(d) The removal of fine particles and dissolved solids called _____.

(e) Unit operation involves a _____ change such as separation, filtration, evaporation.

2. State in the following statements which is True and which is False : $1 \times 5 = 5$

(a) Sulphuric acid is used in the manufacture of fertilizers.

(b) Boiler feed water should be hard in nature.

(c) HCL can be manufactured by frash process.

(d) In hard water cleansing quality of soap is depressed.

(e) Sodium carbonate is also known as baking soda.

3. Choose the correct option :

$1 \times 5 = 5$

(a) Water is

(i) polar solvent

(ii) non-polar solvent

(iii) non-polar uncharge solvent

(iv) an amphiphatic solvent

- (b) Pollution of water is responsible for
- (i) oil refineries (ii) paper factories
 - (iii) sugar mills (iv) All of these
- (c) Hardness of water is due to the presence of salts of
- (i) potassium (ii) chlorine
 - (iii) magnesium (iv) boron
- (d) Raw materials used in solvay process are
- (i) salt (ii) limestone
 - (iii) coke (iv) All of these
- (e) The acid used in lead storage battery cell is
- (i) phosphoric acid (ii) sulphuric acid
 - (iii) nitric acid (iv) hydrochloric acid.

4. Answer the following questions : 1×5=5

- (a) What is the full form of BOD ?
- (b) What is used as oxidizing agent in the determination of COD ?
- (c) What do you mean by polymerization ?
- (d) Write one application of caustic soda.
- (e) Which is faster and most accurate analysis method BOD or COD ?

5. Match the subjects of Column-I with the subjects of Column-II following : 1×5=5

COLUMN – I	COLUMN – II
(a) Contact process	(i) Nitric acid
(b) Electrolytic process	(ii) Sulphuric acid
(c) Ostwald process	(iii) Soda ash
(d) Solvay process	(iv) Caustic soda
(e) Frasch process	(v) Sulfur

PART – B

Marks – 45

6. (a) Write the two uses of Sulphuric acid. 2
- (b) Draw a neat flow chart and explain the contact process used in the manufacture of Sulphuric acid. 7
7. Write in details about the preparation of industrial process water with the help of a proper diagram. 9

8. (a) Which process is used in the manufacture of sodium carbonate and what is the other name of sodium carbonate ? 2
- (b) Draw a neat flow chart and explain the manufacturing process of sodium carbonate. 7
9. Draw a neat flow chart and explain the manufacturing process of nitric acid. 9
10. Differentiate between : $3 \times 3 = 9$
- (a) Unit processes and Unit operations
 - (b) Nitration and Chlorination
 - (c) Hard water and Soft water.
11. Write short notes on : $3 \times 3 = 9$
- (a) Physical and Chemical properties of HCl Acid
 - (b) Lagooning
 - (c) Bad effects of natural water on boilers.