

Total No. of printed pages = 5

**END SEMESTER REGULAR / RETEST
EXAMINATION, JULY – 2023**

Branch : Chemical

Semester : 4th

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 :

- (i) *All* questions of PART-A are compulsory.
- (ii) Answer any *five* questions from PART-B.

PART – A

Marks – 25

1. Fill in the blanks :

10×1=10

- (a) _____ is the reaction for Nitration.
- (b) _____ is the reaction for Polymerization.

[Turn over

- (c) _____ is the reaction for Hydrogenation.
- (d) Boiling removes _____ hardness.
- (e) Zeolite process is used for removing _____ hardness.
- (f) Scaling in boilers is due to _____.
- (g) Most polluted water is _____.
- (h) _____ process is used for manufacture of NaOH.
- (i) Oleum has the formula _____.
- (j) _____ is a raw material for manufacture of HNO_3 .

2. State whether the following statements are True or False : $1 \times 10 = 10$

- (a) Sea Water contains NaCl.
- (b) Chemical Pollutants are Ca, Mg, Na and other chemicals.
- (c) Tank water is pure water and can be used for drinking.
- (d) Drinking water should be purified before consumption.
- (e) Temporary hardness is due to the presence of $\text{Na}(\text{HCO}_3)_2$

(f) Permanent hardness can be removed by boiling.

(g) Nitric Acid is manufactured by Oswald's process.

(h) Hard water is used in Textile and Sugar Industries.

(i) Scaling in boiling is caused by hard water.

(j) COD stands for Chemical Oxygen Demand.

3. Choose the correct answers of the following :

1×5=5

(a) Most pure form of water is found in

(i) Spring water (ii) River Water

(iii) Lake Water

(b) Sludge in boilers is due to

(i) Permanent hardness

(ii) Temporary hardness

(iii) Soft water

- (c) HCl Acid manufactured by a process known as
- (i) Haber's process
 - (ii) Zeolite process
 - (iii) Chambers process
- (d) Temporary hardness is removed by
- (i) Zeolite process
 - (ii) Adding Cl_2
 - (iii) Heating to boiling point
- (e) One of the raw materials required for manufacturing of Nitric Acid is
- (i) N_2
 - (ii) NH_3
 - (iii) CO_2 .

PART – B

Marks – 45

4. (a) Draw a neat diagram showing the removal of permanent hardness by any process. 5
- (b) Explain the above process in detail. 4
5. (a) Draw a neat diagram of Hot lime soda process. 5
- (b) Explain the above process briefly. 4

6. (a) Draw a neat flow diagram showing the manufacture of H_2SO_4 . 5
- (b) Explain the manufacture of NaOH . 4
7. (a) Write down one chemical property of HCl . 1
- (b) Draw a neat flow chart showing the manufacture of HNO_3 . 5
- (c) Explain the flow chart of HNO_3 manufacture. 3
8. (a) Draw a neat diagram showing the process of purifying municipal water. 5
- (b) Explain in brief the operation of sand and gravel filter. 4
9. Explain about the manufacture of Sodium carbonate by Solvay process with a neat diagram. 9