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**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 : $10 \times 1 = 10$
 - (a) _____ is the reaction for Nitration.
 - (b) _____ is the reaction for Polymerization.

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(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 process 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 :

$1 \times 5 = 5$

- (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