Total No. of printed pages = 5

# END SEMESTER EXAMINATION – 2019

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.

## PART – A

Marks – 25

Questions on PART – A are compulsory.

1. Fill in the blanks : 1×10=10

(a) Full form of BOD is _____.

(b) Full form of COD is _____.

(c) Hardness is of _____ types.

(d) Boiling removes _____ hardness.

(e) Zeolite process is used for removing _____ hardness.

[Turn over

(f) Scaling in boilers is due to _____.

(g) Lake or pond water contains _____.

(h) _____ process is used for manufacture of NaoH.

(i) Oleum has the formula _____.

(j) _____ is a raw material for manufacture of $H_2So_4$.

2. State in the following statements which is true and which is false : 1×10=10

(a) River water contains NaCl.

(b) Sea water contains NaCl.

(c) Tank water is pure water and can be used for drinking.

(d) Drinking water should be acidic in nature.

(e) Temporary hardness is due to the process of $Na(HCo_3)_2$.

(f) Permanent hardness can be removed by boiling.

(g) Hard water doesn't from lather easily with soap.

(h) Hard water is used in textile and sugar Industries.

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

(j) $P^H$ is nothing but $P^H = -\log [H^+]$.

3. Select the right answer of the following questions : $1 \times 5 = 5$

(a) Most pure form of water is found in

(i) Spring water

(ii) River Water

(iii) Lake water

(b) Scaling in boilers is due to

(i) Permanent hardness

(ii) Temporary hardness

(iii) Soft water

(c) Sulphuric acid manufactured by a process known as

(i) Habers process

(ii) Zeolite process

(iii) Chambers process

(d) Permanent 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**

Answer any *five* of the following questions. $9 \times 5 = 45$

4. (a) Draw a neat diagram showing the removal of permanent hardness by zeolite process. 5

(b) Explain the above process in detail. 4

5. (a) Draw a neat diagram of lime soda process. 5

(b) Explain the above process briefly. 4

6. (a) Draw a neat flow diagram showing the manufacture of NaOH. 5

(b) Explain the manufacture of NaOH. 4

7. (a) Write down one chemical property of $HNO_3$. 1

(b) Draw a neat flow chart showing the manufacture $HNO_3$. 5

(c) Explain the flow chart of $HNO_3$ manufacture. 3

8. (a) Draw a sand gravel filter. 5

(b) Explain in brief the operation of sand and gravel filter. 4