RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2016

THIRD YEAR [BATCH 2013-16]

Date : 03/05/2016 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11 am – 1 pm **Paper :** VII [Unit – I&IV] Full Marks : 50

[Use a separate Answer Book for each Unit]

Unit - I

***Answer <u>any eight</u> questions* :** [8×5]

1. Write an overview of the Indian Heavy Chemical Industries and its future prospects. [5]

2. Describe the manufacturing process of sulfuric acid with respect to
   a) Raw material used
   b) Reaction involved
   c) Process flow sheet [1+2+2]

3. Draw a sketch of the membrane cell and explain its operational mechanism. Explain briefly the physico-chemical principles for manufacturing of caustic soda and chlorine by electrolysis of Brine. [3+2]

4. How uranium is recovered from phosphate rock? What is the benefit of recovering uranium? Explain briefly the method of manufacturing of phosphoric acid by wet process. [2+1+2]

5. Write names and formula of two fertilizers both containing nitrogen and phosphorous as soil neutrients and discuss the principles of their manufacturing process. [5]

6. Discuss the manufacturing process of soda ash in detail. [5]

7. a) Differentiate between single and triple super phosphate.
   b) SO_3 is absorbed in 98% H_2SO_4 not in water. Explain why?
   c) 18% conc. HCl is used for pickling of steel/iron. Explain the process. [2+1+2]

8. a) Write the advantages of membrane cell process over the Hg-electrolytic process for caustic soda and chlorine production.
   b) Write the key properties and typical use of silicon carbide or calcium carbide. [2+3]

9. Write the principle of the manufacturing process of the following (**<u>any two</u>**) : [2·5+2·5]
   a) Graphite
   b) Calcium Carbide
   c) Phosphoric acid
   d) Urea

10. Write the reactions involved for the production of Nitric acid from ammonia. Explain the important physico-chemical parameters are involved to maximize its production. Write the industrial conditions used for it. [5]

Unit - IV

***Answer <u>any two</u> questions* :** [2×5]

11. Explain why a Lacquer dries faster than oleoresinous varnish.
    Name pairs of pigments for following colours : Black, Blue, Green and Red
    What is Paint drier? Give two examples. Write the chemical composition of "French Polish". [1+2+1+1]

12. Explain the term PVC (Pigment Volume Concentration) with mathematical expression.
The volume composition of 320 litre ocean blue coloured paint is as under :

Pigment and extender	**Litre**
TiO_2 (Rutile)	10
ZnO	3
Phthalocyanine Blue (BASF)	2
Phillips Carbon Black	1
Precipitated Chalk	4
<u>Vehicle</u>	
Butylated M-F resin in Xylol (50% solid)	100
<u>Solvent</u>	
N-Butanol, Toluol, mixed xylol	200

Evaluate its PVC to show that it is a glossy enamel (paint) [2+3]

13. What is plastic emulsion paint? Why is it eco-friendly? Name two polymers used in its formulation. How you can differentiate between drying and non-drying oil? Name one drying oil commonly used in paint. Name one petroleum hydrocarbon solvent commonly used in paint. [1+1+1+1+1]

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