# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College affiliated to University of Calcutta)**

**B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2017**

**THIRD YEAR [BATCH 2014-17]**

Date : 02/05/2017 **INDUSTRIAL CHEMISTRY (Honours)**

Time : 11 am – 1 pm **Paper :** VII (U I & IV) Full Marks : 50

**[Use a separate Answer Book for each Unit]**

## UNIT-I

Answer **any eight** questions: [5×8]

1. Discuss the current Indian Heavy Chemical Industries scenario and its future prospects. 5

2. a) Write the chemical reactions involved in the contact process of manufacture of sulphuric acid.
   b) Draw the flow diagram of the contact process.
   c) Explain why $SO_3$ is absorbed in 98% $H_2SO_4$ not in water? 2+2+1

3. a) Write the physico-chemical principles of the nitric acid manufacturing process.
   b) Discuss the nitric acid manufacturing process in details.
   c) Write the use of nitric acid. 2+2+1

4. a) Describe wet process of phosphoric acid manufacture.
   b) Write all the chemical reactions involved.
   c) How Uranium is recovered from phosphate rock? 3+1+1

5. a) Name the different types of electrolytic cells which are used for the production of caustic soda and chlorine. Why mercury cells are not used in Industry now-a-days?
   b) Draw a neat flow diagram of membrane cell process for caustic soda and chlorine manufacturing process.
   c) Write the name of the membrane used. 2+2+1

6. Describe the manufacturing process of Soda Ash by modified Solvay process with respect to
   a) Raw material used;
   b) Chemical reactions involved;
   c) Flow diagram. 5

7. Explain briefly important engineering process parameters involved in a typical urea manufacturing plant starting from Naphtha / Natural gas. Name three large manufacturing units in India and their location. 5

8. a) What is meant by the term N-P-K used in labelling the fertilizers.
   b) Write in detail the manufacturing process of Triple super phosphate. 2+3

9. Choose the correct answer: 1+1+1+1+1
   a) Calcium Carbide manufacturing process require the temperature
      i) 300 – 500$^oC$
      ii) 750 – 900 $^oC$
      iii) 2000 2200 $^oC$
      iv) 3500 – 4000 $^oC$

b) Silicon carbide
   i) is an abrasive material
   ii) is an adhesive material
   iii) is a glass
   iv) is a ceramic

c) For nitrogenous fertilizer the fertilizer value is expressed as
   i) Nitrogen content
   ii) Potassium content
   iii) $KNO_3$ content
   iv) $HNO_3$ content

d) Ostwald process is used to manufacture of
   i) $H_2SO_4$
   ii) $H_2PO_4$
   iii) $HNO_3$
   iv) CaC

e) Dry chlorine can be handled in a vessel made of
   i) PVC
   ii) Steel
   iii) Brass
   iv) Nickel

10. Write down the method of manufacture of the following (**any two**) 2.5+2.5
   a) Graphite
   b) Bleaching powder
   c) Chloramine–T
   d) Sodium thiosulphate
   e) Silicon carbide

## UNIT-IV

Answer **any two** questions: [5×2]

11. a) Why lacquers dry faster than oleo resinous varnish?
   b) Name pair of pigments for following colours:
   (i) Black (ii) Blue (iii) Green (iv) Red
   c) What is 'Paint Drier'? Give an example.
   d) Name a Paint Thinner. 1+2+1+1

12. a) What do you mean by the term: Pigment volume concentration (PVC)?
   b) 320 lit. of a paint was analysed as under:

| Pigment and extenders | (Litres) |
|---|---|
| $TiO_2$ (R) | 10 |
| Blane Fix | 3 |
| Phthalocyamnine Blue | 3 |
| Carbon Black | 1 |
| Precipited chalk | 3 |
| | |
| Vehicle (Binder) | |
| Butylated melamine – | |

| | | |
|---|---|---|
| Formaldehyde resin in Xylol (50% solid) | | 100 |
| <u>Solvents</u> | | |
| A mixture of Tolvol, mixed xylene and C–9 solvent | | 200 |
| | Total | 320 lit. |

Evaluate PVC and opine on the nature of paint. 1+4

13. a) Define the term: Insecticide and Herbicides.
    b) Name one each of Inorganic, Natural and Synthetic insecticides.
    c) Outline the synthesis of Benzene Hexachloride (Gammaxace, ICI). 1+2+2

14. Write short notes on (**any two**): 2½+2½
    a) Plastic Emulsion paints
    b) Water Thinnable Emulsion paints
    c) Varnish (oleo resinous and spirit both)
    d) Anticarrosive Bituminous coating (Black Japan)

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