

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SIXTH SEMESTER EXAMINATION, MAY 2015

THIRD YEAR

INDUSTRIAL CHEMISTRY (Honours)

Date : 05/05/2015

Time : 11 am – 1 pm

Paper : VII

Full Marks : 50

[Use a separate Answer book for each Unit]

Unit – I

Choose the correct alternative. (Answer any four questions from Question No. 1 – 8)

[4×1]

1. Silicon Carbide
a) is an adhesive b) is an abrasive c) is a type of glass d) is brittle
2. Fertiliser value of a nitrogeous fertiliser is expressed in terms of its _____ content
a) N_2 b) KNO_3 c) NO_2 d) HNO_3
3. In contact Process SO_3 is absorbed in 98% H_2SO_4 and not in water because
a) water forms an acid mist which is difficult to absorb
b) the purity of acid is affected
c) SO_3 is sparingly soluble in water
d) SO_3 is a very corrosive substance
e) in water excessive heat is generated
4. The temperature of Calcium Carbide furnace is
a) $300^\circ - 500^\circ C$ b) $750^\circ - 900^\circ C$ c) $2000^\circ - 2200^\circ C$ d) $3500^\circ - 4000^\circ C$
e) none of these
5. Dry chlorine can be handled in a vessel made of
a) Iron and steel b) PVC c) Nickel d) Brass
6. Washing Soda is chemically represented as
a) Na_2CO_3 b) $Na_2CO_3 \cdot H_2O$ c) $Na_2CO_3 \cdot 10H_2O$ d) $NaHCO_3$
7. Mannheim furnace is used in the manufacture of
a) Hydrochloric acid b) Sulphuric acid by chamber process
c) Calcium Carbide d) Corundum
8. P_2O_5 content in superphosphate is about _____ percent
a) 30 – 35 b) 15 – 20 c) 65 – 70 d) 85 – 90

9. Answer any three :

[3×2]

Write down the reactions involved in the production of the following materials. Give examples of their uses (at least one) for each compound :

- a) Superphosphate
- b) Chloramine T
- c) Graphite
- d) Sodium Thiosulphate
- e) Silicon Carbide
- f) Carbon black
- g) Silicon Nitride

Answer any three from Question No. 10 – 16 :

[3×10]

10. a) Write down briefly the manufacturing process with chemical reactions for the production of sulphuric acid by contact process. [5]
b) Narrate the physico-chemical principles involved in the manufacture of Sulphuric acid by contact process. [3]
c) Draw a flow sheet of the process. [2]

11. a) What are the different types of electrolytic cells used for the production of caustic soda and chlorine. Explain the merits and demerits of the different types of cells. [2+3]
b) Draw a sketch of the membrane cell and explain its operational mechanism. [2+3]
12. a) Describe the manufacturing technology for the production of Soda Ash by Solvay process. Describe also the modified method of Solvay process presently used in the industry. Give two important uses of Soda Ash. [3+2+1]
b) Give all the chemical reactions involved and physico chemical principles involved in the process. Give a block diagram of the process. [3+1]
13. a) How urea is manufactured starting from CO_2 and NH_3 ? [3]
b) Briefly describe the process giving all chemical reactions. How urea as fertilizer helps the production of crops. [3]
c) How can the yield of urea be increased? [2]
d) Give a flow sheet of the process. [2]
14. a) Describe wet process of Phosphoric Acid manufacture. Give all chemical reactions involved in the process. How Uranium is recovered from phosphate rock and what is its impact in the energy consumption? [3+2+2]
b) Describe the method of manufacture of Bleaching Powder. Give its industrial uses. [2+1]
15. a) What is triple Superphosphate? How triple Superphosphate is prepared from phosphate rock. Give chemical reactions. [5]
b) Write down the reactions that take place and the catalyst used in the manufacture of Nitric acid by Ostwald process. Give a flow sheet/Block diagram of the process. [5]
16. Give an overview of the current scenario of the Heavy Chemical industry in India and its future prospect. [10]

Unit – IV

Answer **any two** from Question No. 17 – 21 : [2×5]

17. Answer the following : [5×1]

- a) Why lacquers dry faster compared to oleoresinous varnishes?
- b) What is paint drier? Name two metallic salts used as paint drier.
- c) What is French Polish? Mention its predominant use.
- d) Name two pigments for each color normally used in paint formulation Red, White, Blue and Black.
- e) Name the constituents of Oleoresinous Varnish

18. Write short note on (**any two**) : [2×2.5]

- a) Varnishes
- b) Lacquers
- c) Pigments

19. What is PVC (Pigment Volume Concentration)? [3]

320 lit seablue paint was prepared for refrigerator panel.

Pigment & extenders	(Litres)
TiO ₂ (Rutile)	10.00
Zinc Oxide	3.00
Precipitated Chalk	4.00
Phthalocyanine Blue	2.00
Carbon Black (Phillips)	1.00

Vehicle

Butylated melamine 200.00

Formaldehyde resin in Xylol (50% Solids)

Solvents

Mineral Turpentine 20.00

(White Petroleum Spirit)

Mixed Xylol 80.00

Calculate PVC to prove it is a high gloss decorative / protective surface coating for metal. [2]

20. Write short notes on : [2×2.5]

a) Water Thinnable emulsion Paints

b) Anticorrosive Bituminous coating (Black Japan)

21. Define the term : 'Paints'. Mention principal ingredients of paints. Briefly state the process of blending in a modern paint factory mentioning equipments used. [5]

_____ × _____