PG/IVS/CH - 2204/10

M.Sc. 4th Semester Examination, 2010

CHEMISTRY

PAPER—CH-2204

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

(*Organic and Physical Special*)

Answer any **five** questions, taking at least **two** from each Group

GROUP—A

1. (*a*) Write short notes on : $1\frac{1}{2} \times 2$

   (*i*) Thermoforming

   (*ii*) Compression moulding.

(*b*) What is the importance of additives in plastic processing technology ? Mention four different types of additives used (giving examples) during polymer processing and mention one use of each. 1+4

2. (*a*) Write short notes on : $1\frac{1}{2} \times 2$

(*i*) Calendering

(*ii*) Blow-moulding.

(*b*) Describe the process of injection-molding with help of a schematic diagram. 5

3. (*a*) Explain the synthesis of Nylon 6 and Nylon 66 from their respective monomers. 2×2

(*b*) Discuss four important properties of Nylon polyamides. 2

(*c*) Mention two drawbacks of this family of polymers. 2

4. (*a*) What are polycarbonates ? How are they synthesized with and without using phosgene ? 2×2

(*b*) Write short notes on the properties and applications of polycarbonates. 2×2

5. (*a*) What are LDPE, HDPE and LLDPE, explain on basis of structure and properties ? 2×3

(*b*) Write short notes on any *two* : 2

(*i*) Cellulose nitrate

(*ii*) Epoxy resin

(*iii*) Poly(ethylene terephthlate).

GROUP–B

6. Describe the synthesis of (*i*) Silicone fluids and (*ii*) Silicone rubbers/elastomers starting from the monomer synthesis (*iii*) Write two applications of each of them. 3×2+2

7. (*a*) What is natural rubber ? 2

(*b*) Explain the method used to confirm the structure of NR. 2

(*c*) What is the source of NR and how is it isolated from there ? 4

8. (*a*) Write a detailed synthetic procedure used for commercial synthesis of SBR. 4

(*b*) How is SBR superior to NR ? 2

(*c*) Mention two drawbacks of SBR. 2

9. (*a*) What is butyl rubber ? 1

(*b*) How is it different from polyisobutylene ? 1

(*c*) How are these rubbers synthesized commercially ? 2

(*d*) Mention the important properties and applications (any *two*) of this class of rubbers. 4

(*Inorganic*)

Answer any **four** questions

1. (*a*) Discuss the role of carbon monoxide as

air-pollutant on the basis of concentration profile and control techniques. 3 + 3

(*b*) What do you mean by photochemical smog ? How they can be formed ? What are its effect ? 1 + 2 + 1

2. (*a*) Describe the methods for the estimation of the following parameters in water sample : 4+4

(*i*) Chemical oxygen demand (COD)

(*ii*) Total hardness (Ca and Mg).

(*b*) Explain the reactions of $Pb(C_2H_5)_4$ on combution of gasoline. 2

3. (*a*) Write critical notes on sampling of gases and vapours. 5

(*b*) What is chemiluminescence ? How can it be used for environmental analysis ? 2+3

4. (*a*) Describe the methods for determination of D.O. 4

(*b*) How flame-ionization detector works ? 3

(*c*) How electrostatic Samplers and Impingers work for sampling of particulates ? 3

5. (*a*) Describe the method for the estimation of the nitrate and nitrite in water sample. 4

(*b*) Give an account of air quality standards of primary air pollutants. 4

(*c*) Distinguish between oxidising and reducing smogs. 2

6. (*a*) Discuss the health effect of SO_2 as air pollutant. 2

(*b*) Discuss the NO_x control mechanism from stationary sources. 5

(*c*) Control of industrial air pollution is achieved by using process change. Explain with suitable example. 3

7. (*a*) What are the material of construction normally used for discharge and collecting electrode in electrostatic precipitator ? 2

(*b*) Derive an expression to calculate the collection efficiency of an ESP as function of gas flow rate. 3

(*c*) Discuss the operating principle of a cyclone separator. 5

Or

8. Describe the use of the following techniques in the analysis of pollutants : 5 + 5

(*i*) Atomic Absorption Spectrophotometry (AAS)

(*ii*) Non Dispersive Infra-red Spectrometry (NDIS).

9. (*a*) What is softening ? Discuss ion exchange softening process in detail. 3

(*b*) What are the basic differences of chemical coagulation and electrocoagulation ? 3

(*c*) Write down the sources of contamination in ground water. 2

(*d*) Write the principle of reverse osmosis. 2
