# 2016

## M.Sc. 4th Seme. Examination

## CHEMISTRY

### PAPER—CEM-404

*Full Marks* : 40

*Time* : 2 Hours

*The figures in the margin indicate full marks.*

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

*Illustrate the answers wherever necessary.*

**Polymer** (*Physical* + *Organic*)

Answer any *four* questions.

**1.** (a) Write down the average composition of natural rubber.

(b) Describe the preparation of smoke-sheet of rubber.

(c) What is 'racking' of raw rubber ? 3+3+2

**2.** (a) Describe the manufacture of pale-crepe rubber from natural rubber latex.

(b) What are reinforcing fillers ? Give an example. 5+3

**3.** (a) How is nitrile rubber prepared ?

(b) Mention some uses of butyl and nitrile rubber.

(c) State the Goush-Joule effect of natural rubber. 4+2+2

**4.** (a) What is butyl rubber ? How is it prepared ?

(b) What is the role of acetic acid in rubber processing ?

(c) What are processing aids ? 4+2+2

**5.** (a) Give an example of each of the following :
antioxidants, antiozonants, softeness.

(b) Describe the method of preparation of surfactant ion selective electrode membrane. 3+5

**6.** (a) Describe, in brief, the process of sulphurless vulcanization.

(b) What do you mean by the term "accelerators" in the process of vulcanization ?

(c) How can you prepare HDPE ? 3+2+3

**7.** (a) Mention some uses / applications of polycarbonates.

(b) Describe, in brief, the synthesis of epoxy resins. 3+5

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## **Environmental** (*Inorganic*)

Answer any *four* questions.

**1.** Discuss the instrumental techniques for monitoring of $NO_x$ and sulpherdioxide air pollutants. 5+5

**2.** Discuss the basic mechanism for removing particulate matter for gas streams with respect to

(i) Gravitational settling chambers ;

(ii) Cyclone separators ;

(iii) Electrostatic precipitators ;

(iv) Wet scrubbers. $2\frac{1}{2} \times 4$

**3.** (a) Discuss industrial wastewater treatment on the basis of primary and tertiary treatment.

(b) Discuss the anaerobic treatment process of waste water. (3+3)+4

**4.** Write notes on :

(i) Water softening by zeolites ;

(ii) Purification of water for municipal purposes. 5+5

**5.** Draw flow diagram for the following and discuss

(i) Activated sludge system for secondary (biological) waste water treatment.

(ii) Three stage nitrification-denitrification process.

5+5

**6.** (a) How radioactive substances are removed from water ?

(b) A sample of water has 0.1248 g/L $CO_3^{2-}$ and 0.05978 g/L $HCO_3^-$. Calculate the alkalinity due to carbonate and bicarbonate at neutral pH.

(c) What do you mean by strength of sewage ?

(d) What is oxidation ditch ? 2+4+2+2

**7.** Write notes on :

(i) Electrodialysis : Advanced treatment of water ;

(ii) Control of $SO_2$ emission for sulphuric acid plants ;

(iii) Metal recovery from metal bearing waste water.

$5+2\frac{1}{2}+2\frac{1}{2}$

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