B.Sc. Semester-VI Examination, 2022-23

CHEMISTRY [Honours]

Course ID : 61417 Course Code : SH/CHEM/604/DSE-4

Course Title : Polymer Chemistry

Time : 1 Hour 15 Minutes Full Marks : 25

The figures in the right-hand margin indicate marks.

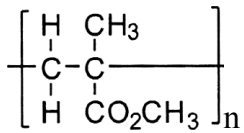
Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** of the following questions: 1×5=5

a) Write the name of one natural polymer.

b) Mention the molecular forces present in polymers.

c) Write the common and IUPAC name of the following polymer:



d) What is 'glass transition temperature' of polymers?

e) Give an example of initiator for radical polymerization.

f) Which factor is responsible for Crystallinity in nylon 6,6 polymer?

g) What is Conducting Polymer? Give one example.

h) Mention one method for determination of 'Number Average Molecular Weight' of polymers.

2. Answer any **two** of the following questions: 5×2=10

a) i) Discuss the morphology of Crystalline Polymers.

ii) Differentiate between Novalac resin and Bakelite. 2+3=5

b) What is Number average and Weight average molecular weight? How they are related with each other? 3+2=5

c) Show that the rate of free radical polymerization process is dependent on the rate constant of these three steps (Initiation, Propagation and Termination) and concentration of monomer and initiator. 5

d) What are thermosetting polymers? What are elastomers? Cite one inorganic colorant used in polymer processing. 2+2+1=5

3. Answer any **one** of the following questions: 10×1=10

a) i) What is meant by condensation polymerization? Discuss its mechanism and kinetics with one example.

ii) Derive the following expressions for the entropy of mixing of a polymer solution when n_2 moles of polymer is added to n_1 moles of a solvent, using Flory-Huggins Model:

$$\Delta S_{mix} = -R\left[n_1 \ln \Phi_1 + n_2 \ln \Phi_2\right]$$

where Φ_1 and Φ_2 are the volume fractions of the solvent and polymer respectively. (1+4)+5=10

b) Describe the preparation and one important application of the following polymers: 2×5=10

i) Poly (vinyl acetate)

ii) Poly (methyl methacrylate) (PMMA)

iii) Nylon 6

iv) Acrylic polymer

v) Polyaniline

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