MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Reg. No.										

DEPARTMENT OF SCIENCES, IV SEMESTER M. Sc (CHEMISTRY)
END SEMESTER EXAMINATIONS, JUNE 2021

POLYMER CHEMISTRY [CHM 5009]
(REVISED CREDIT SYSTEM-2017)

Time: 2 Hours Date:12-06-2021 MAX. MARKS: 40

Note: (i) Answer **ANY FOUR FULL** questions
(ii) Draw diagrams, and write equations wherever necessary

1A. i) Write the synthesis of the following polymers
a) Poly vinyl alcohol b) Terylene
ii) Explain the function of an initiator in free-radical polymerization with suitable example.
(3+2)

1B. i) Explain the factors that affect the thermal degradation of polymers.
ii) Write the comparison between the bulk and solution polymerization techniques.
(3+2)

2A. i) Write the reactions for the interaction between
a) Poly vinyl alcohol and ethylene oxide
b) Poly acrolein and sodium bisulphite
ii) Explain the function of a Lewis acid as initiator in cationic polymerization with a suitable example.
(3+2)

2B. i) With chemical reactions, explain the conditions to get Resole and Novalk phenol-formaldehyde resins.
ii) Give suitable reasons:
a) Polymers like polyvinyl acetate and poly methyl methacrylate are usually amorphous
b) Thermosetting polymers do not show plastic deformation.
(3+2)

3A. i) Explain the mechanism of ring opening polymerization of ethylene oxide.
ii) Explain the gas phase polymerization with an example
(3+2)

3B.i)What is a 'Ziegler-Natta Catalyst'? Explain its function in coordination polymerization with suitable example.
ii) Explain the effect of crystallinity of a polymer on its hardness and permeability.
(3+2)

4A. i) Write the reaction with conditions for the conversion of
a) Polyacrylamide into poly vinyl amine
b) Poly vinyl alcohol into poly urethane
ii) With a neat diagram, explain the mechanism of emulsion polymerization.

(3+2)

4B. i) Explain the general mechanism of oxidative degradation of polymer with a suitable example.
ii) What is geometrical isomerism? Explain the geometrical isomerism by taking the example of poly butadiene.

(3+2)

5A. i) Give the synthesis of
a) Ploy carbonates b) Silicone rubber
ii) Justify the following statements
a) Polyethylene shows lower Tg value compared to Nylon 6
b) Polystyrene is highly soluble in toluene than in ethanol

(3+2)

5B. i) Describe the steps involved in plastic recycling process.
ii) Give suitable reasons:
a) Crystalline polymers exhibit higher chemical-resistance than the less crystalline polymers of similar chemical structure.
b) Polymers are polydisperse in nature

(3+2)

6A. i) Explain the technological importance of following properties of polymers
a) Plastic deformation b) Tensile strength
ii) Commercial PVC always added with stabilizers. Justify the statement

(4+1)

6B. i) Explain poly addition polymerisation with reference to styrene.
ii) Define the term 'glass transition temperature' of a polymer. Explain its technological importance.

(3+2)