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, APRIL 2019

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

Time: 3 Hours Date: 26-04-2019 MAX. MARKS: 50

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

1A. (i) Write the reaction of polyvinyl alcohol with
a) Ethylene oxide b) Acetic anhydride and anhydrous sodium acetate
(ii) As the crystallinity of a polymer increases, its tensile strength increases but the permeability decreases. Justify the statement.

1B. (i) Write the three possible ways of termination reaction for the coordination polymerisation of vinyl chloride using a Ziegler –Natta catalyst.
(ii) Give suitable reasons- Polymers are polydisperse in nature.

1C. Explain the mechanism of action of antioxidants. [(3+1) + (3+1) +2]

2A. (i) Discuss the synthesis of polycarbonate and mention its two applications.
(ii) Give suitable reasons- The melting point of polyurethane is much less than that of the corresponding polyamide.

2B. (i) Write the reaction of polyacrolein with
a) Ethanol ii) hydroxylamine
(ii) Give suitable reasons: Polystyrene is a tougher and stronger polymer than polyethene.

2C. Explain the optical isomerism exhibited by polyvinylchloride. [(3+1) + (3+1) +2]

3A. (i) Write the synthesis of polyethylene terephthalate.
(ii) Explain the mechanism of photo degradation in the case of poly methyl methacrylate.

3B. (i) Discus the initiation and propagation steps for the cationic polymerisation of propylene using BF_3 as the catalyst.
(ii) Give suitable reasons: Nylon 6 exhibits higher Tg value compared to polyethylene with same degree of polymerisation.

3C. Discuss the factors influencing on thermal degradation of polymers.
[(2+2) + (3+1) +2]

4A. (i) Mention advantages and limitations (two each) of suspension polymerization technique
(ii) Write the synthesis of polypropylene glycol.

4B. (i) Explain the high energy photo degradation of polyisobutylene.
(ii) Discuss the synthesis of polyurethane.

4C. Explain the grafting process performed by means of free radicals with a suitable example. [(2+2) + (2+2) +2]

5A. (i) Explain the mechanism of emulsion polymerization.
(ii) Discuss solid phase polymerization with an example.

5B. (i) Write the reaction for the interaction of
a) Polyvinyl methyl ketone with hydroxylamine
b) Polyacrylic acid with sodium hydroxide
c) Polyvinyl amine with acetic anhydride
(ii) Give reasons- Addition of plasticizer improves the plasticity of a polymer.

5C. Explain the steps involved in the recycling of plastics.
[(2+2) + (3+1) +2]

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