Reg. No.										

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

DEPARTMENT OF SCIENCES, IV SEMESTER M.Sc. CHEMISTRY
END SEMESTER EXAMINATIONS, MAY 2022

SUBJECT: Polymer Chemistry [CHM 6009]
(CHOICE BASED CREDIT SYSTEM 2020)

Time: 3 Hours Date:06 May 2022 MAX. MARKS: 50

Note: (i) Answer **ALL** questions

1A. i) Explain the mechanism of grafting styrene on polybutadiene. [3]
ii) Discuss the function of a Lewis acid as the initiator in cationic polymerization. [2]

1B. i) Describe the preparation of the following polymers with conditions required and give two uses for each
a) Polypropylene b) Polymethyl methacrylate [3]
ii) Discuss the optical isomerism shown by polyvinyl chloride. [2]

2A. i) Explain with an example, the three types of termination reactions involved in free-radical polymerization. [3]
ii) Discuss the steps involved in plastic recycling. [2]

2B. i) Write the reaction with the conditions required for the conversion of
a) Polyacrylamide into polyvinyl amine
b) Polynitropropylene into polypropylenamine [3]
ii) Give reasons:
a) Polybutadiene with a higher percentage of cis-isomers usually shows better elongation property.
b) Polyvinyl chloride is a tougher and stronger polymer than polyethylene. [2]

3A. i) Explain the effect of molecular structure on the following properties of polymers
a) Plastic deformation b) Tensile strength [3]
ii) Discuss the preparation, properties, and two uses of Polychloroprene. [2]

3B. i) Discuss the synthesis of the following polymers with chemical reactions and give two applications for each:
a) Polypropylene glycol b) Polytetrafluoroethylene [3]
ii) Explain with reactions the synthesis of polyp-xylene by gas-phase polymerization [2]

4A. i) Explain the preparation, properties, and applications of Urea-formaldehyde resins. [3]
ii) Explain the effect of crystallinity on the properties of polymers. [2]

4B. i) Write the reaction for the interaction of polyvinylalcohol with
a) Ethylene oxide b) Sodium and ethyl chloride [3]
ii) Compare the mechanical degradation with ultrasonic degradation. [2]

5A. i) Write the reaction for the interaction of polystyrene with
a) Cyclohexene b) Fluorine [3]
ii) Describe the preparation, properties, and two uses of Polyisobutylene [2]

5B. i) With chemical reaction, describe the preparation of an aramid by polycondensation of an aromatic diacid chloride and an aromatic diamine. Write the unique properties and uses of aramids [3]
ii) Explain the mechanism of random degradation of polymers with an example. [2]

*****