

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2020****Subject Code:3133609****Date:06/03/2021****Subject Name: Chemistry & Technology of Polymers****Time:10:30 AM TO 12:30 PM****Total Marks:56****Instructions:**

1. Attempt any **FOUR** questions out of **EIGHT** questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Write at least three differences between addition and step growth polymerization reactions **03**
- (b) Write the Mark-Houwink equation and explain all the terms in it. **04**
- (c) Describe the three main steps of free radical polymerization. **07**
- Q.2** (a) What is ebulliometry? How is it used in the determination of polymer molecular weight? **03**
- (b) How monomer functionality is exhibited in case of monomers participating in addition and step growth reactions? **04**
- (c) Derive the equations for 'number average and weight average molecular weight' of a polymer sample. **07**
- Q.3** (a) Classify the following polymers between addition and step growth polymers and write at least one important property and use of each. **03**
Polyvinyl chloride, Nylon, Polyester, and Polystyrene.
- (b) Explain with examples the terms coordinate bond, hydrogen bond and the covalent bond in a chemical compound? Which one of them is the mostly found in polymers? **04**
- (c) Compare and contrast suspension and emulsion techniques of polymerization. **07**
- Q.4** (a) Name the monomers used in the manufacture of Polyester, PVC, and PMMA. **03**
- (b) What is copolymerization? State two examples of industrial copolymers. **04**
- (c) Explain the solution technique and state advantages of the technique over other techniques of polymerization. **07**
- Q.5** (a) Why are initiators and inhibitors used in polymer synthesis? **03**
- (b) Explain with a graphical representation the effect of heating/cooling on a polymeric substance. **04**
- (c) Explain in detail melt polycondensation. **07**

- Q.6 (a)** Define crystallinity? How it is calculated? **03**
- (b)** Define the terms: **04**
degree of polymerization
solubility parameter
- (c)** What is the primary requirement for a step growth polymerization reaction to occur? Explain how molecular weight builds up in a step growth polymerization reaction. **07**
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- Q.7 (a)** Explain in brief the steam reforming process for manufacturing ethylene. **03**
- (b)** How do amorphous and crystalline parts of a polymer sample show different behavior during dissolution in a solvent? **04**
- (c)** Describe osmometric or light scattering experimental method of determination of molecular weight of a polymer sample. **07**
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- Q.8 (a)** What are ADU and VDU in crude distillation process? **03**
- (b)** What is interfacial polymerization technique? How is it different from other techniques? **04**
- (c)** Describe ultracentrifugation or end group analysis experimental method of determination of molecular weight of a polymer sample. **07**
