

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2163902

Date:01/05/2018

Subject Name:Nanopolymers and Nano-composites

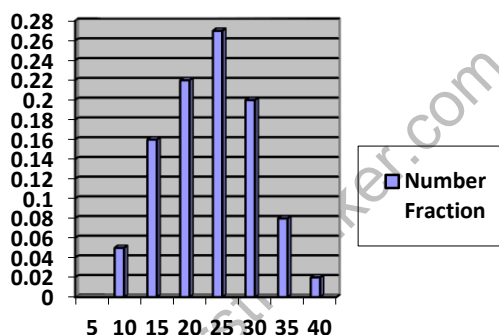
Time:10:30 AM to 01:00 PM

Total Marks: 70

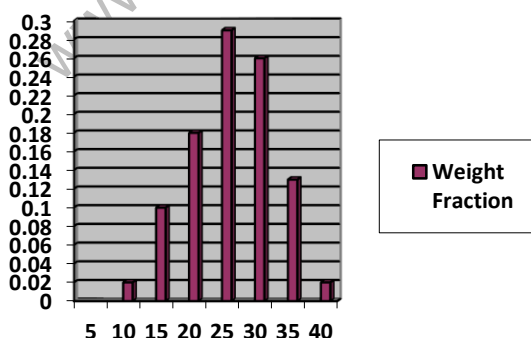
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Differentiate step growth and chain growth polymerization.	03
	(b) Explain in general: What is solid phase Cryochemical synthesis	04
	(c) What is polymer? Explain its structure, molecular arrangement and characteristics.	07
Q.2	(a) Describe chain growth polymerization including all the steps.	03
	(b) Define Tg (glass transition temperature) and mention factors affecting Tg	04
	(c) Write a short note on metal nanoparticle formation.	07
	OR	
	(c) Define molecular weight and degree of polymerization.	07



Molecular Weight 10^3 (g/mol)



Molecular Weight 10^3 (g/mol)

Solve:

Assume that the molecular weight distributions shown in Figure are for poly(vinyl chloride). For this material, compute:

- (a) the number-average molecular weight,
- (b) the degree of polymerization (number avg. and weight avg.), and

- Q.3** (a) Differentiate homopolymer and heteropolymer. **03**
 (b) Explain the formation of polyelectrolyte Gel-surfactant complexes **04**
 (c) Explain in detail processing of nanophase ceramic nano composite. **07**

OR

- Q.3** (a) Draw the Schematic diagram of MMT (natural smectic clay 2:1 phyllosilicates). **03**
 (b) Explain the structure of metal polymer complexes. **04**
 (c) Explain step growth polymerization and its kinetics. **07**
- Q.4** (a) Explain Copolymers and state its types. **03**
 (b) A polydisperse sample of polystyrene is prepared by mixing three *monodisperse* samples in the following proportions: **04**

2 g	10,000 molecular weight
1 g	10,000 molecular weight
1 g	50,000 molecular weight

Using this information, calculate the number-average molecular weight, weight-average molecular weight, and PDI of the mixture.

- (c) Explain the two biomedical applications in detail for use of metal containing polymer. **07**

OR

- Q.4** (a) Differentiate between polymer and block copolymer **03**
 (b) Elaborate: block copolymers for ordered polymeric nanostructures. **04**
 (c) Classification of the polymers on the basis of the microstructure. **07**

- Q.5** (a) Define Nano cavities. **03**
 (b) Describe printing of organometallic polymers by soft lithography. **04**
 (c) Write a short note on polymer clay nanocomposites. **07**

OR

- Q.5** (a) What is the role of vacuum chamber in the synthesis of metal polymer nanocomposite **03**
 (b) Explain briefly the formation of ordered polymer structures at interfaces. **04**
 (c) Elaborate: polymer layered silicate nanocomposites. **07**
