Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711607N **Date: 06-01-2014**

Subject Name: Polymer Science and Synthesis of Polymers

Time: 10.30 am – 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.**

Q.1 (a) Give detailed classification of polymers. **[7]**

(b) Define number average and weight average molecular weight. A sample of polystyrene has number average molecular weight of 100,000. Determine its weight average molecular weight if, its polydispersity index is 5. **[4]**

(c) Differentiate between a polymeric molecule and a normal macromolecule. **[3]**

Q.2 (a) Compare and contrast chain growth and step growth polymerization reactions. **[7]**

(b) (i) What is kinetic chain length? Give relationship between kinetic chain length and degree of polymerization. **[4]**

(ii) What is "tromsdorff effect"? **[3]**

OR

(b) Write a note on carother's equation stating its importance. **[7]**

Q.3 (a) Derive kinetic expression for free radical polymerization reaction, considering steady state assumption. **[7]**

(b) What do you mean by colligative property? Explain any one method based on colligative property to determine molecular weight of polymer. **[7]**

OR

Q.3 (a) Write a note on Ring opening polymerization. **[7]**

(b) Give a comparative account of emulsion and suspension polymerization techniques. **[7]**

Q.4 (a) Discuss bulk polymerization technique, stating its advantages and disadvantages. **[7]**

(b) What is meant by initiator efficiency? AIBN is used as a free radical initiator in polymerization of methylmethacrylate in benzene at 60^{O} C. Determine rate of polymerization given: [I] = 0.02 mol/L; [M] = 2 mol/L, f=1; (kp = 705; kd = 50X 10^{-6}; kt =0.85 X 10^{-5} in appropriate units) **[7]**

OR

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Q.4 (a) Giving example, illustrate the mechanism of cationic addition polymerization. **[7]**

(b) Write a note on polyaddition polymerization giving suitable example. **[7]**

Q. 5 (a) What do you mean by solid phase peptide synthesis? Explain in detail Merrifield synthesis. **[7]**

(b) Differentiate between (i) Isotactic, atactic & syndiotactic polymers **[7]**
(ii) Crystalline and amorphous polymers.

OR

Q. 5 (a) What do you understand by polymer degradation? Explain different types of degradations occurring in polymers. **[7]**

(b) Explain chemical transformation of a polymer into another polymer by different chemical reactions. **[7]**

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