CLASS: BE   SEMESTER : V
BRANCH: CHEMICAL ENGG.- PLASTICS & POLYMER   SESSION : MO/19

SUBJECT: PC5003 MACROMOLECULAR SCIENCE-II

TIME: 3 HOURS   FULL MARKS: 60

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	Describe the average functionality of stoichiometric and non-stoichiometric mixture.	[2]
Q.1(b)	Calculate the average functionality of adipic acid/ hexamethylene tetraamine, and adipic acid/ maleic acid/ glycerol systems.	[4]
Q.1(c)	Derive Carothers equation. Tabulate its scope and limitation.	[6]
Q.2(a)	What are the advantages of interfacial polymerization process?	[2]
Q.2(b)	Calculate the gel point for a bifunctional and trifunctional monomer based polycondensation reaction.	[4]
Q.2(c)	Demonstrate the kinetic expressions for catalytic step polymerization with assumptions.	[6]
Q.3(a)	How can you evaluate the termination in addition polymerization by combination or by disproportionation?	[2]
Q.3(b)	Initiator efficiency in addition polymerization is less than 100% - justify.	[4]
Q.3(c)	What are ceiling temperature and floor temperature in addition polymerization? Discuss the relevant equation and discuss with a relevant graph.	[6]
Q.4(a)	Define living polymerization. State its advantages.	[2]
Q.4(b)	Graphically illustrate the gel effect, its proper explanation. Apply the suitable polymerization technique to solve the problem.	[4]
Q.4(c)	Demonstrate the bimetallic mechanism of coordination polymerization technique. Discuss the role of nature of solvent in this process.	[6]
Q.5(a)	What is copolymerization? Give an example.	[2]
Q.5(b)	Describe graft copolymerization in details.	[4]
Q.5(c)	Recall the mechanism of copolymerization and derive the kinetic rate expression.	[6]
Q.6(a)	What happens to a polymer as a result of degradation?	[2]
Q.6(b)	With suitable example describe the role of substituents on thermal degradation.	[4]
Q.6(c)	Describe the mechanism of oxidative degradation. Applying your previous knowledge, how can you prevent this type of degradation? Discuss in detail.	[6]
Q.7(a)	What is bead polymerization? Why is it so called?	[2]
Q.7(b)	Describe the advantages and disadvantages of bulk, solution, suspension and emulsion polymerization.	[4]
Q.7(c)	Tabulate the different ingredients used along with their functions in emulsion polymerization.	[6]

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