



Reg. No. : .....

Name : .....

Fourth Semester M.Sc. Degree Examination, August 2015

Branch : POLYMER CHEMISTRY

PC 241 : Polymer Chemistry – IV

(2008 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

## SECTION – A

Answer **any two** among **a), b)** and **c)** from **each** question. **Each** sub-question carries **2** marks.

1. a) Give an equation widely used to represent the influence of temperature on viscosity and explain the terms.  
b) What is pseudoplastic behaviour ?  
c) Explain the principle of design by scaling up.
2. a) What are telechelic polymers ? Give a typical use of telechelic polymers.  
b) What are polymer bound catalysts ? What are their advantages ?  
c) Why do clays need treatment for use in nanocomposites ?
3. a) Distinguish essential and non-essential amino acids.  
b) What is DNA fingerprinting ? What is its principle ?  
c) What is collagen ? Where does it occur ?
4. a) Which is the most widely used vinyl adhesive ? What are its important applications ?  
b) What is Araldite ? Why is it supplied as two parts ?  
c) What are the four components of paints ? Of these components, which function is provided by polymers ?

P.T.O.

5. a) What are the two outstanding properties of silicones ?  
 b) Why are poly (phosphazenes) considered partly inorganic and partly organic ?  
 c) How are polysilane polymers different from siloxanes and phosphazenes in structure ?

(2×10=20 Mar

## SECTION – B

Answer either a) or b) of each question and each question carries 5 marks.

6. a) Explain the salient features of two widely used rheological models.  
 b) What is the significance of shear rate and shear stress ? Write down the expressions for shear rate and shear stress at the wall for a Newtonian fluid flowing in a cylindrical channel.
7. a) Distinguish the salient features of filled polymers from those of polymer nanocomposites.  
 b) Explain the principle of the three microscopy techniques used for measuring exfoliation in nanocomposites. Explain the utility and limitations of any one.
8. a) Describe the salient features of the primary structure of the protein.  
 b) Which are the common techniques used for controlled drug release ? Describe any one.
9. a) Briefly describe the specific properties required of polymers to be used in paints.  
 b) Describe briefly the importance of surface treatment for efficient adhesive bonding.
10. a) How are poly (phosphazenes) suited for surface reactions ? How can such reactions be advantageously used ?  
 b) Explain the advantage of inserting a silphenylene group into polysiloxane backbone.

(5×5=25 Mark

## SECTION - C

Answer **any three** questions and **each** question carries **10** marks.

11. Write down the equation that gives the output of a single screw extruder and explain the significance of each variable. Prepare a computer program to get the output from these variables.
  12. Compare the salient features of the following methods of preparing nanotube based polymer nanocomposites :
    - a) Solution mixing
    - b) In situ polymerisation
    - c) Melt mixing.
  13. Briefly describe the biomedical applications of polymers bringing out their advantages compared to other materials.
  14. Describe the salient features of the following types of adhesives giving one example each with relevant formulations
    - a) Hot melt
    - b) Solution
    - c) Water based.
  15. What is electron delocalization ? Why are polysilanes capable of electron delocalization ? Give a brief outline of the properties and applications of polysilanes based on this property.  
**(3×10=30 Marks)**
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