**0906E524**  Candidate's Seat No :_____

**M.Sc Sem.-2 Examination**
**P - 409**
**Polymer Science**
Time : 2-00 Hours]         **June 2022**         [Max. Marks : 50

Instructions:  All Questions in **Section I** carry equal marks
Attempt any **THREE** questions in Section I
Question IX in **Section II is COMPULSORY**

**Section I**

Q I      A. Explain in brief SEM analysis process used for polymers.         7
         B. Compare viscometry test using abbelohde and Ostwald viscometer.        7

Q II     A. What is meant by thermal analysis? Explain any one thermal analysis         7
         process used for polymers and its composites.
         B. Describe mooney- viscometer test for rubbers.         7

Q III    A. Differentiate between DSC and TGA analysis.         7
         B. What is meant by polydispersity? Define Mn and Mw.         7

Q IV     A. Explain working principle of GPC process.         7
         B. What is FTIR? Explain in detail working principle of FTIR process.         7

Q V      A. Differentiate  SEM & TEM analysis process.         7
         B. Explain in detail NMR process with its final application.         7

Q VI     A. Write down working principle of XRD process with its advantages and         7
         disadvantages.
         B. Write short notes on i) Colligative property of polymer ii) Osmometry         7

Q VII    A. How DMTA analysis more useful than DSC & TGA to analyze the thermal         7
         properties of polymers.
         B. Explain in brief cup viscosity test with its advantages and disadvantages.         7

Q VIII   A. What is degree of crystallinity? How does it will affect the results during         7
         XRD  analysis process?
         B. Specify any five reason why ultra-thin coating of metal apply over the         7
         sample surface during morphology analysis.

**Section II**

Q IX     1. Tg of polymer can be determined by_____ analysis process         1
         (a)  SEM
         (b)  DSC
         (c)  TGA
         (d)  All of the above

P.T.o

2. To determine viscosity of rubber_____ is generally used.    1
   (a) End group analysis process
   (b) Mooney viscometer
   (c) Osmometry test
   (d) Ostwald viscometer

3. The stages of degradation of polymeric material can be observed by _____    1
   (a) DSC
   (b) TGA
   (c) DMA
   (d) All of the above

4. The graph between Wavenumbers v/s Transmittance is plotted during _____    1
   analysis.
   (a) DMA
   (b) TGA
   (c) GPC
   (d) FTIR

5. Molecular Weight of polymer is determined by_____.    1
   (a) GPC
   (b) Osmometry
   (c) Light scattering
   (d) All of the above

6. _____ for in SEM analysis is the process of applying an ultra-thin    1
   coating of electrically conducting metal gold, palladium, silver etc.
   (a) Sputter coating
   (b) Etch coating
   (c) Metal coating
   (d) Polish coating

7. Elemental analysis is nothing but a_____ test.    1
   (a) EDS
   (b) EDX
   (c) EDAX
   (d) All of the above

8. 3D images of samples as a result will examined in _____ analysis.    1
   (a) AFM
   (b) SEM
   (c) TEM
   (d) DMTA

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