

**ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS .****MARKS 16\*5=80**

1. a) Give the chemical reaction for production of Dimethyl terephthalate (DMT). Terephthalic acid (TPA), Ethylene glycol (EG), Hexamethylene Diamine (HMDA), Adipic Acid (AA) and Acrylonitrile used for the production of synthetic fibres.  
b) Give the side reactions taking place in the production of PET and also give various catalysts used for the production of PET.
2. a) Give the chemical reaction for conversion of DMT and EG to PET, TPA and EG to PET, coproduct to Polycaprolactum and HMDA and AA to N66 (Nylon-66).  
b) State why washing and drying step is required for the production of Nylon-6 by V.K. tube and explain how it is eliminated in ICP process.  
c) Give the reasons for production of intermediate, product DGT in PET production and 'HA' salt in Nylon-66 production.
3. a) With the help of suitable graphs, explain the effect of water concentration and Temperature of polymerization on and extent of reaction in nylon-6 production.  
b) State the major differences in production steps of Nylon-6 and Nylon-66.  
c) Give the chemical reaction involved in production of carbon from PAN precursors
3. a) State any five advantages of aqueous suspension polymerization over solution polymerization of polyacrylonitrile and compare and contrast dry and wet spinning of acrylic fibre production.  
b) State why Homopolymer PAN cannot be produced and Spun in to fibre and give various comonomers used with their functions.  
c) Briefly explain how Boron fibres are produced by chemical vapour deposition method (CVD).
4. a) Give the chemical reactions for production of Nomex and Kevlar. On the basis of their chemical structure, explain why Nomex and Kevlar with respect to mechanical and thermal stability and also give mechanical and thermal properties of these fibres.  
b) Define thermo-tropic and leotropic LCPS. Explain the behaviours of LCPS.
2. a) Briefly explain the production, properties and applications of PBZO and PBZT fibres.  
b) Show that theoretical modulus of UHMWHDPE is one fourth of diamond and also explain why its difficult to produce UHMWHDPE by melt spinning.  
c) With the help of diagram briefly explain gel spinning of polyethylene (UHMWHDPE)
3. a) Define heat setting and drawing phenomenon. With the help of graphs describe various structural and property changes taking place in synthetic fibres as a result of drawing and heat setting.  
b) Draw the diagram of any one tow to top converter and state any two objectives of tow to top conversion.
4. a) Define the term false twist texturing process. Explain various factors, which determine the efficiency of false twist texturing process.  
b) Briefly explain how synthetic yarns are textured by air texturing process.