(c) Discuss the advantages of using CSM (chlorosulfonated polyethylene) and CM (chlorinated polyethylene) for cable sheathing. Explain their chemical resistance, flame retardance, and weatherability. (5×3=15)

5. (a) Discuss the process control parameters in polymer extrusion—temperature profile, screw speed, pressure, cooling water temperature—and their effect on final cable properties.

(b) Describe the process of co-extrusion in cable manufacturing. Explain how two or more polymers are extruded together to form multilayer insulation or sheathing with improved performance.

(c) Explain how extrusion faults such as sharkskin, orange peel, die drool, porosity, and rough surfaces occur, and suggest corrective actions related to polymer and process parameters. (5×3=15)



[This question paper contains 4 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 10291** **K**

Unique Paper Code : 6093010016

Name of the Paper : Wire and Cable Technology (DSE)

Name of the Course : **B.Sc. (H) Polymer Science (UGCF)**

Semester : VII

Duration : 2 Hours Maximum Marks : 60

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question No. **1** is compulsory.

1. (a) What is the role of an insulator in a wire or cable?

(b) What is a semiconductor layer in a power cable used for? Why are semiconductive materials used around XLPE insulation?

(c) Explain environmental stress cracking (ESC) in polymeric cable materials.

(d) How density, crystallinity, and amorphous structure influence the flexibility, toughness, and thermal performance of polymers used in cables.

(e) Explain the role of polar and nonpolar polymers in determining the dielectric performance of cables. (5×3=15)

2. (a) Discuss the importance of dielectric strength and insulation resistance in determining the performance of a cable. How are these properties tested and evaluated?

(b) Describe environmental characteristics such as moisture resistance, flame retardance. Explain how these influence cable design for harsh environments.

(c) Explain the differences between thermoplastics (HDPE, LDPE, PVC) and elastomers (EPDM, CSM, NBR) used in cable insulation and sheathing. (5×3=15)



3. (a) Compare the dielectric properties of common cable insulation materials (PVC, PE, XLPE, EPR, PTFE, silicone). Explain how these differences determine their suitability for LV, MV, HF, and communication cables.

(b) Explain the concept of heat resistance in polymeric wire and cable materials. Discuss how chemical structure, crosslinking, and additives influence the ability of insulation to withstand elevated temperatures.

(c) Explain how conductor size, material type (Cu/Al), and stranding influence heat dissipation and permissible temperature in cables. (5×3=15)

4. (a) Explain how thermal conductivity influences the selection of polymeric insulation for high-current or high-temperature applications. Compare polymers with low vs. high thermal conductivity.

(b) Explain why thermoplastic elastomers (TPE) and polyurethanes (PU) are preferred in environments requiring both flexibility and moderate chemical resistance.