PROCESSING OF POLYMERS AND POLYMER COMPOSITES

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TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 8 weeks (18 Jan' 21 - 12 Mar' 21)
EXAM DATE : 21 Mar 2021

PRE-REQUISITES : No-prerequisite.

INTENDED AUDIENCE : UG/ PG Students of Mechanical Engineering., Production Engineering, Chemical Engineering, Polymer Science and Engineering Textile Technology, Working Professionals in plastics and related industries. It is a core course for UG/PG Students.

INDUSTRIES APPLICABLE TO : All industries where polymer and polymer composites products are being designed, developed and used, such as automobile, aerospace and defense.

COURSE OUTLINE :

The main objective of the this course is to impart an understanding of the manufacturing science and engineering of polymers and polymer composites which is usually not covered at the UG level. The course deals with the study of the basic nature of different polymers and polymer composites and the manufacturing processes associated thereof. The classification of engineering materials and processing techniques, the structure and mechanical properties of plastics, thermoplastics and thermosets, the various processing techniques of polymers such as Extrusion, Injection molding, Thermoforming, Compression molding, Transfer molding, etc have been explained with relevant and specific examples.

ABOUT INSTRUCTOR :

Prof. Inderdeep Singh is currently working as Associate Professor in Department of Mechanical and Industrial Engineering at Indian Institute of Technology Roorkee. He has taught among others, industrial engineering courses such as Production Planning and Control, Product Design and Development, Work System Design, Industrial Management and Quality Management. He has been actively involved in the National Mission Project on Education Through ICT (NME-ICT) of Government of India.

COURSE PLAN :

Week 1**:** Introduction to course, Engineering materials and processing techniques, Thermoplastics and thermosets, Processing of polymers, Thermoforming process

Week 2**:** Extrusion, Compression molding, Injection molding.

Week 3**:** Transfer molding, Rotational molding, Blow molding, Composite materials: basic concepts, Classification of composite materials.

Week 4**:** Processing of polymer composites, Hand-layup, Spray-layup, Compression molding, Injection molding.

Week 5**:** Reaction injection molding, Autoclaving, Resin transfer molding, Filament winding, Pultrusion.

Week 6**:** Sheet molding, Pre-pegging and challenges in primary processing of composites, Secondary processing of polymer composites, Joining of polymer composites, Adhesive joining.

Week 7**:** Mechanical joining, Microwave joining, Induction and resistance welding, Drilling of polymer composites.

Week 8**:** Conventional vs ultrasonic drilling, Remedies for reducing drilling induce damages, Research tools for secondary processing, Numerical problems and case studies.