



## **IIT Mandi** **Proposal for a New Course**

**Course number** : IC-141  
**Course Name** : Product Realization Technology  
**Credit** : 2-0-4-2  
**Distribution** : L-T-P-C  
**Intended for** : UG  
**Prerequisite** : None  
**Mutual Exclusion**: *(courses with high similarity not allowed to credit by the students after or along with this course)*

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### **1. Preamble:**

Product Realization Technology combines market requirements, technological capabilities, and resources to define new products, their designs and the requisite manufacturing and field support processes. This course will cover product realization technology related to metals, ceramics and polymers. Experiments will provide hands on experience w.r.t. various product realization technologies.

### **2. Course Modules with quantitative lecture hours:**

- **Introduction:** Engineering materials, their manufacturability and application (2 Hours)
- **PRT for Structural Applications (Metals & Alloys):** Casting (sand casting, permanent mold casting, investment casting), forming (Rolling, Forging, Extrusion, Sheet metal operations), machining (drilling, lathe, milling), joining, Additive manufacturing (SLS, SLM) (8 Hours)
- **PRT for Light weight applications (Polymers):** Classifications of plastics, blow molding, injection molding, extrusion, compression molding, vacuum forming, Additive manufacturing (FDM, SLM), laser machining, joining methods. (6 Hours)
- **PRT for High Temperature Applications (ceramics and glasses):** Powder manufacturing, mixing and blending, compacting, Sintering (with SPS), hot iso-static pressing (5 Hours)
- **PRT for High Performance Applications (Composites):** Microwave curing,

compression molding, resin infusion microwave curing, pultrusion, filament winding (**5 Hours**)

- **PRT for Electronic Applications (Semiconductors):** Thin film deposition, photolithography, wet bulk micromachining/etching, screen printing, 3D printing, Fabrication of PCBs. (**2 Hours**)

**Laboratory (2 credit):**

S.No.	Equipment	Experiment	Turns
1.	Lathe, milling, shaper machine	Facing, turning and grooving operations on mild steel rod	1
2.	Sintering	To demonstrate sintering process for ceramic/metallic powders	1
3.	Microwave composite processing	To demonstrate manufacturing of composite laminates	1
4.	Fitting	To make fillet, chamfer, drilling and tapping on mild steel flat	1
5.	Welding	To perform arc welding, gas welding and spot welding and FSW	1
6.	Sheet metal	To perform shearing, bending and riveting of galvanised iron sheet	1
7.	Foundry	To sand cast an aluminium rod	1
8.	CNC lathe and milling	To machine objects using CNC machining processes	1
9.	Laser machining	To demonstrate laser machining of an acrylic sheet	1
10.	Advanced Manufacturing	To demonstrate thin film deposition, lithography, screen printing, fabrication of PCBs.	1
11.	Additive manufacturing	To create objects using advanced 3D printing processes	1
12.	Injection molding	To understand the plastic injection molding process	1
			12

**3. Text books:**

*(Relevant and Latest, Only 2)*

1. Groover, M.P., 2020. Fundamentals of modern manufacturing: materials, processes, and systems. John Wiley & Sons.
2. Kalpakjian, S. and Schmid, S.R., 2018. Manufacturing engineering and

technology, 2001. New Jersey: Prentice Hall

**4. References: None**

*(No limit on numbers, relevant)*

*Standard format can be followed, the formats should be similar)*

**5. Similarity with the existing courses: None**

**(Similarity content is declared as per the number of lecture hours on similar topics)**

S. No.		Course Code	Similarity Content	Approx. % of Content
1.	Nil	-	-	-

**6. Justification of new course proposal if cumulative similarity content is >30%:**

NA