- Ise, N., Tabushi, I., (1983) "An Introduction to Speciality Polymers", CUP Archive.
- Inamuddin, Ahamed M. I., Boddula, R., Altalhi, T., (2022) "Polymers in Energy Conversion and Storage".
- Kroschwitz, J. I. (2003) "Encyclopedia of polymer science and technology", John Wiley.
- Mark, H. F. (2013). "Encyclopedia of polymer science and technology", John Wiley & Sons.

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DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-14)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
3D PRINTING OF POLYMERS	4	3	0	1	Class 12th with Physics, Chemistry	---

Learning objectives

- Impart students to the fundamentals of various 3D Printing techniques for application to various industrial needs.
- Students will be able to convert part files into STL format and will understand the method of manufacturing of liquid based, powder based and solid based techniques.

Learning outcomes

The Learning Objectives of this course are as follows:

After studying this paper, students will be able to

- Use software tools for 3D printing
- Prepare 3D printed modules
- Construct products using LOM and FDM technologies

SYLLABUS OF DSE-14

THEORY COMPONENT-

UNIT 1: (15 Hours)

BASICS OF 3D PRINTING TECHNOLOGIES

Introduction to 3D printing, advantages. commonly used terms, process chain, 3D modeling, classification of 3D printing process (comparing different 3D printing technologies, including FDM, SLA, SLS, and MJ.), applications to various fields.

UNIT 2: (15 Hours)

MATERIALS FOR 3D PRINTING

Comparing the different material types available for 3D Printing product, including PLA, ABS, PETG, TPE, nylon, PC, as well as 8 exotic filaments that are not focussed on physical properties.

UNIT 3: (15 Hours)

3D PRINTING TECHNOLOGY

Laminated object manufacturing (LOM): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

Fused deposition modelling (FDM): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies, practical demonstration

PRACTICAL COMPONENT (30 Hours)

- Manufacturing of additives by selective laser Sintering (SLS)
- To prepare fibre by FDM
- Manufacturing of Polyamide products by powder bed fusion
- Product manufacturing by extrusion 3D printing process (fusion, deposition, modelling)
- Direct ink writing of 3D functional materials
- To manufacture polymer products by Multi jet fusion
- To prepare photoreactive polymeric materials by material jetting.
- To prepare the shoe sole by 3D printing.
- To prepare filament by FFF (fused filament fabrication)
- Preparation the elastomeric thread by 3 D printing technology

ESSENTIAL/RECOMMENDED READINGS

- Chua C.K., Leong K.F. and LIM C.S, (2010) Rapid prototyping: Principles and Applications, World Scientific publications, 3rd Ed.

- Pham, D.T. and Dimov, S.S. , (2001) Rapid Manufacturing, Springer.
- Wohlers, T., (2000) Wohlers Report 2000, Wohlers Associates, 2000

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SUGGESTIVE READINGS

- Jacobs, P. F., (1996) " Rapid Prototyping and Manufacturing"–, ASME Press.
- Gibson, I., Rosen D., Stucker B., 2014) Additive Manufacturing Technologies, Springer, 2nd Ed.

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