## MFPE3011 ADDITIVE MANUFACTURING (3-0-0)

**Course Objective:**

The course aims to provide students to: Understand and explain the fundamentals, historical development, and advantages of additive manufacturing technologies (AMTs), including key processes, terms, and applications across various fields, analyze and differentiate between liquid-based, solid-based, and powder-based AMT systems, including their models, specifications, working principles, applications, and case studies and apply knowledge of additive manufacturing processes to assess and evaluate their advantages, disadvantages, and practical implications through real-world examples and demonstrations.

Syllabus

**Module-I: (10 Hours)**

Introduction, Prototyping fundamentals, Historical development, Advantages of AMT, Commonly used terms, process chain, 3D modelling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, RP data formats, Classification of AMT process, Applications to various fields

**Module-II: (10 Hours)**

Liquid based systems: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. Solid ground curing (SGC): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

**Module-III: (10Hours)**

Solid based systems: Laminated object manufacturing (LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies, practical demonstration

**Module-IV: (10 Hours)**

Powder Based Systems: Selective laser sintering (SLS): Models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

**Course outcomes:**

After the completion of this course, students will be able to:

CO1: Understanding and remembering - Define and describe the fundamental concepts, commonly used terms, and historical development of additive manufacturing technologies (AMTs).

CO2: Comprehension - Explain the process chains, data formats, and the applications of AMTs in various fields

CO3: Application - Apply the principles of additive manufacturing

CO4: Analysis - Differentiate between the various additive manufacturing processes.

CO5: Evaluation - Critically assess the effectiveness and practical implications of different AMTs.

**Books:**


1. Chua C.K., Leong K.F. and LIM C.S Rapid prototyping: Principles an Applications, World Scientific publications, 3rdEd., 2010
2. D.T. Pham and S.S. Dimov, “Rapid Manufacturing”, Springer, 200
3. Terry Wohlers, “ Wholers Report 2000”, Wohlers Associates, 2000
4. Paul F. Jacobs, “ Rapid Prototyping and Manufacturing”–, ASME Press, 1996
5. Ian Gibson, Davin Rosen, Brent Stucker “Additive Manufacturing Technologies, Springer, 2nd Ed, 2014.