MEPE3010 PRODUCT DESIGN & PRODUCTION TOOLING (3-0-0)

Course Objectives

The objectives of this course are to:

- Provide an understanding of the fundamentals of product design, including design considerations, development, and value analysis.
- Familiarize students with various stages of process planning, including sequence design, machine/tool selection, and cost estimation.
- Develop competency in the design of dies for forging and sheet metal operations.
- Introduce the principles and practices of designing jigs, fixtures, and cutting tools.
- Enable students to apply design principles in real-world production tooling, enhancing both productivity and manufacturability.

Module - I: (12 Hours)

Product Design-Product design considerations, product planning, product development, value analysis, product specification. Role of computer in product design. Process Planning – selection of processes, machines and tools. Design of sequence of operations, Time & cost estimation.

Module - II: (12 Hours)

Forging design- allowances, die design for drop forging, design of flash and gutter, upset forging die design. Sheet metal working- Design consideration for shearing, blanking piercing, deep drawing operation, Die design for sheet metal operations, progressive and compound die, strippers, stops, strip layout.

Module - III: (12 Hours)

Design of jigs and fixtures, principle of location and clamping, clamping methods, locating methods, Drill Jig bushing, Indexing type drilling Jig. Design of single point cutting tool, broach and form tool. Tooling design for turret lathe. Design of limit gauges.

Course Outcomes:

CO1 Explain the stages of product design and process planning, including product development, value analysis, and cost estimation.

CO2 Select appropriate manufacturing processes, machines, and tools by considering production constraints and specifications.

CO3 Design forging and sheet metal working dies by applying suitable allowances, layout methods, and tool configurations.

CO4 Develop appropriate jigs and fixtures by applying location and clamping principles for accurate and efficient machining operations.

CO5 Design various cutting tools (single point, broach, form tools) and limit gauges for specific production needs.

Books:

1. Product Design & Manufacturing, A K Chitale, R C Gupta, Eastern Economy Edition, PHI.
2. Product Design & Development, Karl T Ulrich, Steven D Eppinger, Anita Goyal, Mc- Graw Hill.
3. A Textbook of Production Engineering, P.C. Sharma, S. Chand & Co
4. Fundamentals of Tool Engineering design, S.K. Basu, S.N. Mukherjee, R. Mishra, Oxford &IBH Publishing Co.
5. Technology of Machine Tools, Krar, Gill, Smid, Tata Mc Graw Hill
6. Jigs & Fixture Design, Edwrd G Hoffman, Cengae Learning.