

**M.TECH. LASER SCIENCE AND TECHNOLOGY FIRST YEAR FIRST SEMESTER
EXAMINATION 2024**

Laser Additive Manufacturing

Time: Three hours

Full Marks 100

Answer any *five*.

1. What is additive manufacturing? What are the differences between traditional machining and additive manufacturing in terms of (i) Use of energy sources (ii) Waste generation (iii) Material properties and (iv) Productivity. **20**
2. What are the advantages and benefits of additive manufacturing? Explain the steps followed in additive manufacturing. **20**
3. What are the different laser system parameters and material properties which play vital role in laser-matter interaction? Briefly state the role played by each of these laser parameters and material properties. **20**
4. Identify and discuss the different factors that influence the diverse use of lasers in additive manufacturing. Discuss the drawbacks of using laser in additive manufacturing? **20**
5. Discuss in detail how temperature dependent surface tension and temperature dependent density of the material can induce motion in the melt pool during laser based additive manufacturing. What are these phenomena called? When does temperature dependent surface tension dominate over temperature dependent density and vice-versa? **20**
6. Write short notes on *any four*: (i) Different types of lasers used in additive manufacturing (ii) STL (iii) Powder bed fusion process (iv) Use of hybrid laser system in AM. (v) Top down approach and bottom up approach in manufacturing. **20**