Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent institution of MAHE, Manipal)

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOV 2018

SUBJECT: ADDITIVE MANUFACTURING TECHNOLOGY [MTE 4009]

(30/11/2018)

Time: 3 Hours **MAX. MARKS: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Appropriate data may be assumed.

1A. Using metal spraying techniques on the additive model, it is possible to create an injection mould for limited number of prototype parts. **04 (3+1)**

i. Explain the technique.
ii. List the reinforcement backing materials used in the technique.

1B. Which polymer category and chain structure would be ideal to select a material for: **04**

i. Tooling Dies
ii. Beverage Containers
iii. Helmets

1C. Define model validation and repair problem. **02**

2A. In what way the problem of wrong orientation of facets is solved? Explain it with the help of STL file shown in figure Q2A. Draw the edge – vertex table showing the file manipulation. **06**

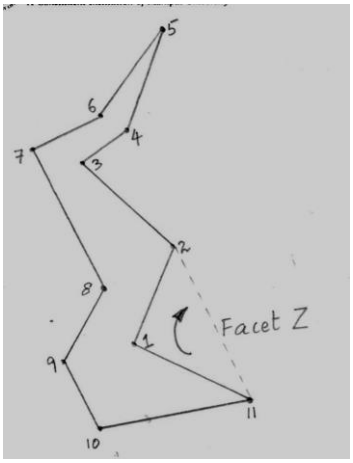

Figure Q2A

2B. In context of reverse engineering in additive manufacturing, answer the following: **03 (1+1+1)**

i. Define reverse engineering.
ii. List out the equipment used in reverse engineering.
iii. Why reverse engineering process is used?

2C. In Laminated Object Manufacturing, the finished part is sealed with urethane, epoxy or silicon spray. State the reason. **01**

3A. Additive models render themselves well to be the master patterns for the creation of metal dies. Lost wax casting process is probably the most important molding process for casting metal. **06 (1+3+2)**

Answer the following:

i. Outline what is lost wax process.
ii. Elucidate on the steps involved in it.
iii. Illustrate the process in a step diagram.

3B. Pure metals and alloys have excellent electrical and heat conductivity and good ductility. Give the reason. **02**

3C. Explain why the strength in cross – linked structures are higher than in linear branched – chain structures. **02**

4A. With the help of a diagram, discuss the principle of Optomec's Laser Engineered Net Shaping (LENS) process. **05**

4B. Describe the step by step process of photopolymerization. Draw the schematic representation of simplified free radical photopolymerization. **05**

5A. Illustrate the key component of Fused Deposition Modelling technique. **04**

5B. i. Distinguish between Hard Tooling and Soft Tooling. **04**
ii. Mention any four fields in medical where additive manufacturing is making a major advancement. **(2 + 2)**

5C. Briefly describe the limitations involved in shell closure process of STL file. **02**