Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: ADDITIVE MANUFACTURING TECHNOLOGY [MTE 4009]

REVISED CREDIT SYSTEM

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

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- Draw neat labelled diagram wherever necessary.

1A. Describe the steps involved in Shell Investment Casting Process in context of additive manufacturing. Also, illustrate the process in a step diagram. **(05)**

1B. Interpret the error in the STL file shown in figure 1B below and apply the appropriate technique to solve it. **(05)**

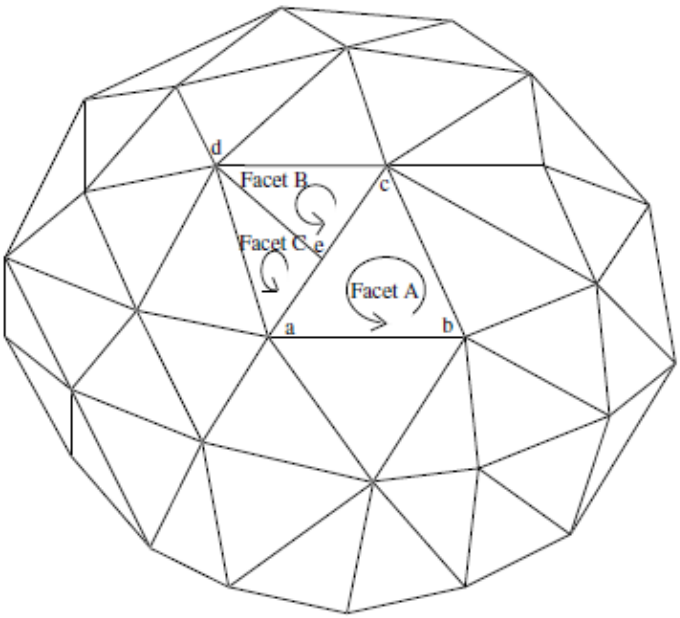

Figure 1B

2A. With the help of a diagram, explain CMET's Solid Object Ultraviolet Laser Printer (SOUP). **(05)**

2B. With respect to Silicon Rubber Tooling (SRT), answer the following questions: **(03)**

i. State the purpose of RTV Tools.

ii. Write the steps involved in preparation of rubber mold for silicon rubber tooling technique.

2C. Distinguish between Conventional Tooling and Rapid Tooling (RT). **(02)**

3A. For the STL file shown in figure 3A below, apply the right-hand rule adopted by STL format and solve the gap encountered. **(06)**

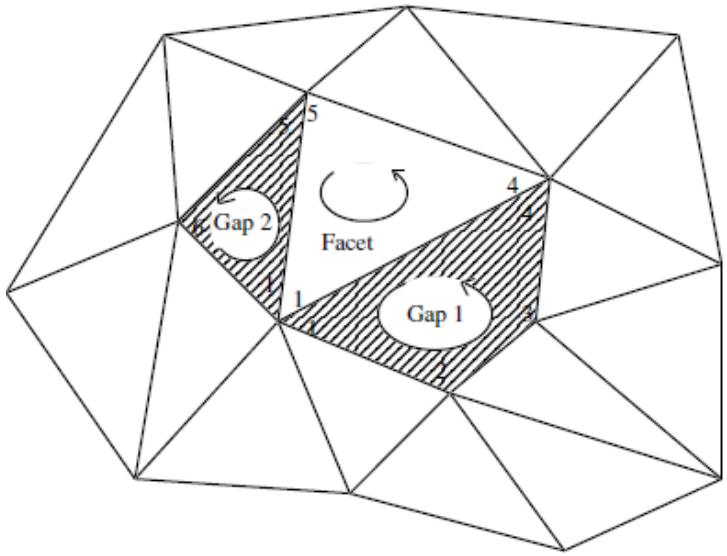

Figure 3A

3B. Read the paragraph below and answer the questions that follow: **(04)**

As there are various influencing factors such as shrinkage, distortion, curling and accessible surface smoothness, it is necessary to apply some post-RP finishing processes to the parts just after they have been produced. These processes can be carried out before the RP parts are used in their desired applications.

i. Give one example of surface coating that can be used to improve the physical properties of the additive product.

ii. List any two reasons why cutting processes are useful in post processing operations.

iii. Name the surface cleaning operations that can be used for better surface quality.

4A. Write a short note: **(06)**

i. Standards of additive manufacturing.

ii. Fundamentals of additive manufacturing.

iii. Benefits of additive manufacturing to product designers.

4B. Many commercial tessellation algorithms used by CAD vendors are not robust and they create a polygonal approximation of models which results in errors. Describe the case where: **(04)**

i. Large curvatures occur in a tessellated file.

ii. Facet edges are collinear.

Draw diagram for both the cases.

5A. Explain the working principle of 3D System's Selective Laser Sintering (SLS) Process. **(04)**

5B. What are the aspects of additive manufacturing? Depict them in a wheel diagram. **(03)**

5C. In an experimental computer- aided jewelry design and manufacturing system jointly developed by Nanyang Technological University and Gintic Institute of Manufacturing Technology in Singapore fine jewelry models were successfully created. **(03)**

Answer the questions below:

i. Name the additive manufacturing process used.

ii. In what way, the additive product was used?

iii. Suggest the suitable post processing operation used for good surface finish.