Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	: RAPID PROTOTYPING AND MANUFACTURING
COURSE CODE	: BNM 30403
PROGRAMME CODE	: BNM
EXAMINATION DATE	: JUNE/JULY 2019
DURATION	: 2 HOURS AND 30 MINUTES
INSTRUCTION	: ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) Summarize how the preparation of CAD model in reverse engineering differs from the standard rapid prototyping process and outline the **TWO (2)** methods of preparing the CAD model in reverse engineering.

(6 marks)

(b) Briefly explain the process of reverse engineering and state **TWO (2)** areas of its applications.

(6 marks)

(c) Coordinate Measuring Machine (CMM) is among the tools used in reverse engineering technology in which concerning the development of a product. By employing Coordinate Measuring Machine (CMM), relates how it can support rapid prototyping process to fabricates the product.

(8 marks)

Q2 (a) Roller or recoater is one of the main components in Selective Laser Sintering (SLS) system. Discuss **TWO (2)** purpose of this component.

(4 marks)

(b) Fused Deposition Modelling (FDM) is an additive manufacturing technique that uses an extrusion method to build the parts;

(i) Demonstrate with a diagram, the details of Fused Deposition Modelling (FDM) fabrication process.

(12 marks)

(ii) Summarize **TWO (2)** different ways how Fused Deposition Modelling (FDM) support material is being removed.

(4 marks)

Q3 (a) Compare the method of bonding (solidification) between these three types of rapid prototyping technologies.

(i) Stereolithography Apparatus (SLA)

(2 marks)

(ii) Layered Object Manufacturing (LOM)

(2 marks)

(iii) Three-Dimensional Printing (3DP).

(2 marks)

(b) Explain in detail, the basic principle of Solid Ground Curing (SGC) with the aid of a schematic diagram and state **TWO (2)** advantages of this process.

(14 marks)

Q4 (a) Differentiate between these three terminologies in relation to its definition

(i) Rapid Prototyping (4 marks)

(ii) Rapid Tooling (3 marks)

(iii) Rapid Manufacturing. (3 marks)

(b) Identifies **FIVE (5)** areas or gaps in which the additive process (rapid prototyping process) is complementary to subtractive process (machining process).

(10 marks)

Q5 (a) Differentiate between these two rapid tooling terminologies in relation to its definition. Support your answers with an appropriate diagram.

(i) Direct Rapid Tooling Making Method (2 marks)

(ii) Indirect Rapid Tooling Making Method (2 marks)

(b) A product shown in **Figure Q4 (b)** will be used as a master pattern to create a mould in which a rapid prototyping process is capable of making a very quick injection mould for a limited number of parts (5 to 50 parts).

(i) Select the appropriate rapid tooling method to create the mould as shown in **Figure Q4 (b)**

(1 mark)

(ii) Demonstrate with a diagram the process to manufacture a wax pattern using the mould made based on the product shown in **Figure Q4 (b)**.

(15 marks)

- END OF QUESTIONS -

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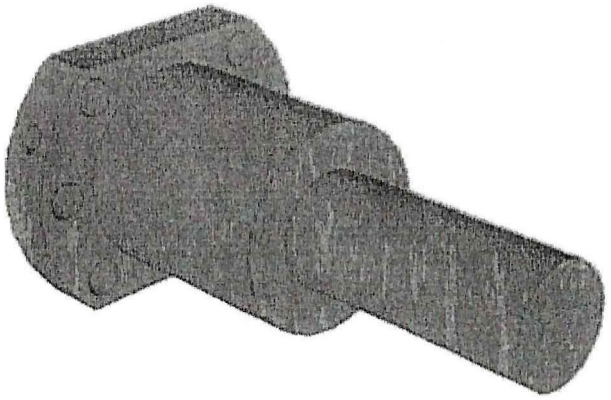

FIGURE Q4 (b)