Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	RAPID PROTOTYPING AND MANUFACTURING
COURSE CODE	:	BNM 20204
PROGRAMME CODE	:	BNM
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Define these three terminologies in relation to its definition

(i) Rapid Prototyping (2 marks)
(ii) Rapid Tooling (2 marks)
(iii) Rapid Manufacturing (2 marks)

(b) Briefly explain the different between the additive manufacturing process and subtractive manufacturing process.

(4 marks)

(c) Identify **FIVE (5)** areas or gaps in which the additive process is complementary to subtractive process.

(10 marks)

Q2 (a) CAD model preparation is one of the most important process in reverse engineering and rapid prototyping process. However, both processes have different method of CAD model preparation. Summarize the difference of CAD model preparation between the both processes.

(4 marks)

(b) Some of the rapid prototyping techniques require support structure in their part fabrication process. Illustrates the meaning of support structure and its purpose.

(2 marks)

(c) Reverse engineering is the reproduction of another manufacturer's product following detailed examination of its construction or composition. Explain **TWO (2)** reasons for manufacturer to use reverse engineering.

(4 marks)

(d) Value engineering (VE) is a systematic method to improve the "value" of goods or products and services by using an examination of function. Value, as defined, is the ratio of function to cost. Predict and explain **FIVE (5)** impacts by extending reverse engineering to value engineering (VE) in organizations.

(10 marks)

Q3 (a) Roller or recoater is one of the main component in Selective Laser Sintering (SLS) system. Discuss **TWO (2)** purposes of this component.

(4 marks)

(b) The Stereolithography Apparatus (SLA) process is the first commercialized rapid prototyping process. It was patented in 1986 and started the rapid prototyping revolution;

(i) Demonstrate with a diagram, details of SLA fabrication process.

(12 marks)

(ii) Summarize **TWO (2)** advantages and disadvantages of SLA fabrication process.

(4 marks)

Q4 (a) Rapid Tooling (RT) techniques have an important role in many industrial branches. Differentiate between these two rapid tooling terminologies in relation to its definition.

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

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

(b) A manufacturing company need to complete an order to produce 50 pieces of part as shown in **Figure Q4 (b)** within one week. This part also will be used as a master pattern to create a mould. As a manufacturing engineer;

(i) Suggest the appropriate rapid tooling method to create the mould for the part shown in **Figure Q4 (b)**.

(1 mark)

(ii) By using appropriate diagram, demonstrate suitable mould fabrication for the part shown in **Figure Q4 (b).**

(15 marks)

Q5 (a) Prototype testing allows the product design to come alive. Discuss **TWO (2)** benefits of prototype testing.

(4 marks)

(b) Failure analysis is the process of collecting and analyzing data to determine the cause of a failure, often with the goal of determining corrective actions or liability. Failure analysis can save money, lives, and resources if done correctly and acted upon. It is an important discipline in many branches of manufacturing industry. As a testing engineer, conclude **TWO (2)** significances of the failure analysis.

(4 marks)

(c) Verification is intended to check that a product, service, or system (or portion thereof, or set thereof) meets a set of design specifications. With the aid of sketch, justify the flow on how to conduct a preparation of verification activities.

(12 marks)

-END OF QUESTIONS -

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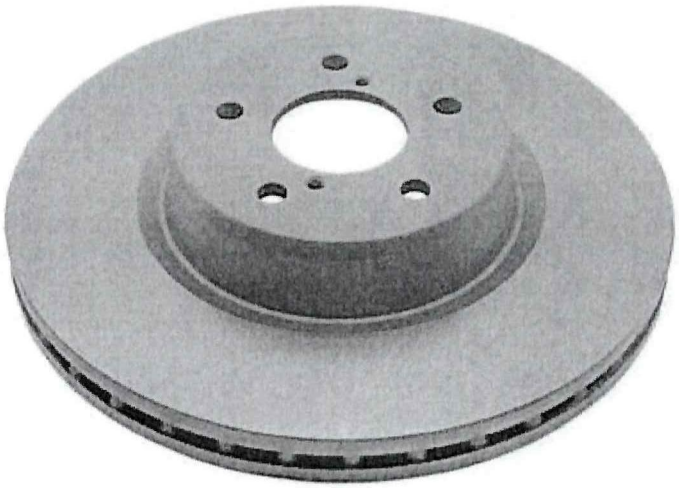

Figure Q4 (b)