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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : RAPID PRODUCT DEVELOPMENT
AND MANUFACTURING
COURSE CODE : BDD40303
PROGRAMME : 4 BDD
EXAMINATION DATE : JUNE 2019 / JULY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER **ALL FOUR (4)** QUESTIONS
IN **SECTION A** AND **ONE (1)**
QUESTION FROM **TWO (2)**
QUESTIONS PROVIDED IN
SECTION B

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

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SECTION A

- Q1** (a) Many terms have been used to describe the meaning of Rapid Prototyping (RP). Discuss **THREE (3)** of such terms and explain why they have been used in place of RP.
(6 marks)
- (b) Write the advantages of Rapid Prototyping (RP) in terms of its beneficiaries such as the product designers, tool designers and manufacturing engineers.
(6 marks)
- (c) Some of the Rapid Prototyping (RP) processes require finishing processes for its produced parts.
- (i) Explain why this process is important?
(ii) Distinguish **THREE (3)** methods to enhance surface roughness and accuracy of RP parts.
(8 marks)
- Q2** (a) Compare the differences between Multi-Jet Modelling (MJM) and Fused Deposition Modelling (FDM). Explain **THREE (3)** strengths and weaknesses of these two systems.
(10 marks)
- (b) Draw the schematic diagram and describe the process Multi-Jet Modelling (MJM) system.
(10 marks)
- Q3** (a) It is known that the process parameters such as layer thickness, part orientation and binder setting saturation value (shell and core) were according to certain values in three-dimensional printing process (3DP). Briefly explain these **THREE (3)** process parameters.
(6 marks)
- (b) Distinguish **THREE (3)** types of material processing capabilities of the Selective Laser Sintering (SLS) systems and briefly explain the benefits of each type.
(6 marks)
- (c) Three-dimensional printer (3DP) creates parts by a layered printing process and adhesive bonding, based on sliced cross-sectional data. Illustrate with appropriate schematic diagram the 3DP systems operations. Write **TWO (2)** types of application for 3DP process.
(8 marks)

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- Q4** (a) Identify the application of rapid tooling (RT) in investment casting (IC). What are the **THREE (3)** advantages and disadvantages of rapid tooling in investment casting?
(6 marks)
- (b) How would you differentiate between the following types of rapid tooling (RT) processes. Support your answer with relevant examples.
- (i) Direct soft tooling
 - (ii) Indirect soft tooling
 - (iii) Direct hard tooling
 - (iv) Indirect hard tooling
- (8 marks)
- (c) What are the Rapid Prototyping (RP) systems that is suitable for sand casting? Draw a suitable schematic diagram of RP part in sand casting process.
(8 marks)

SECTION B

- Q5** (a) Briefly explain how the preparation of CAD model in Reverse Engineering (RE) is differ from the standard Rapid Prototyping (RP) process and write the **TWO (2)** methods of preparing the CAD model in RE.
(6 marks)
- (b) Describe what are the steps in RE process and the **TWO (2)** area of its application.
(6 marks)
- (c) Evaluate how rapid prototyping (RP) process can be combined and helps to effectively functionalize reverse engineering (RE) process.
(8 marks)

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- Q6**
- (a) With a schematic diagram, demonstrate the basic principle of Stereolithography Apparatus (SLA) process.
(6 marks)
 - (b) Briefly explain what it means by over-cured resin in SLA process.
(6 marks)
 - (c) SLA systems build parts in a vat of photo-curable liquid resin that cures or solidifies under the effect of exposure to UV light and this solidification process is famously called a photo-polymerization process. Distinguish photo-polymerization process and what are the key effects resulting from this process?
(8 marks)

- END OF QUESTION -

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