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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
(TAKE HOME)
SESSION 2019/2020**

COURSE NAME : MANUFACTURING PROCESSES
COURSE CODE : BPC 22203
PROGRAMME CODE : BPB
EXAMINATION DATE : JULY 2020
DURATION : 24 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS
OPEN BOOK EXAMINATION

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

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Q1 COVID-19 is transmitted mainly via small respiratory droplets through sneezing, coughing, or when people interact with each other for some time in close proximity. Dealing with this pandemic, the use of personal protective equipment, medical devices, and protective health care materials has become extremely important. Unfortunately, the lack of health care equipment has created extraordinary emergency. In order to overcome this issue, the use of advanced technology such as three-dimensional printing (3DP) to support the supply chain of health care equipment.

- (a) Describe **FOUR (4)** applications of 3DP during COVID-19 pandemic. (8 marks)
- (b) Discuss the manufacturing process of any **ONE (1)** of 3DP product with appropriate illustration based on answer in **Q1 (a)**. (9 marks)
- (c) Explain **FOUR (4) reasons** why 3DP has been widely used to overcome the shortage of health care equipment during this pandemic (8 marks)

Q2 Mak Cik Kiah and Madam Lee are successful manufacturers of wheelchair. There is increasing demand for wheelchairs worldwide due to COVID-19 pandemic. However, they are still using traditional methods for fabrication of wheelchair. As a result, their company fail to meet the market demand. Their product is consists of 13 parts as shown in **Figure Q2**.



Figure Q2: Wheelchair.

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- (a) Identify **ONE (1)** suitable materials to fabricate wheelchair's frame. (1 marks)
- (b) Explain **ONE (1)** reason for material selection based on answer in **Q2 (a)**. (2 marks)
- (c) Identify **ONE (1)** suitable manufacturing processes to produce each part (13 parts) of wheelchair in mass production based on **Figure Q2**. (13 marks)
- (d) Identify **THREE (3)** suitable assembly processes to produce wheelchair in mass production. (3 marks)
- (e) The power source in a particular welding setup generates 3400 W that can be transferred to the work surface with a heat transfer factor = 0.65. The metal to be welded is low carbon steel with melting temperature of 1800 K. The melting factor in the operation is 0.48. A continuous fillet weld is to be made with a cross-sectional area = 18 mm².

Calculate:

- (i) The unit energy required to melt the metal. (3 marks)
- (ii) The travel velocity of the welding operation. (3 marks)

- END OF QUESTIONS -