UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE ASSESSMENT)
SEMESTER II
SESSION 2020/2021

COURSE NAME	:	MANUFACTURING PROCESS
COURSE CODE	:	BEH 41303
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	JULY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS. **OPEN BOOK EXAMINATION**

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) Manufacturing industries can be classified as primary, secondary and tertiary industries. Explain these classifications together with examples.

(6 marks)

(b) Product variety and production quantity are related when comparing typical factories. Point out the relationship.

(4 marks)

(c) State the differences between a shaping process and a surface processing operation.

(4 marks)

(d) List **FOUR (4)** categories of engineering materials with the examples for each of the categories.

(6 marks)

Q2 (a) **Figure Q2(a)** shows a level transmitter with special flange mounted on top of an acidic tank in a process automation. Evaluate the elements of surface texture of the flange based on the application.

(11 marks)

(b) A square metal tube used in an office furniture as **Figure Q2(b)** undergo several manufacturing processes. Based on the figure:

(i) Conclude the manufacturing process, energy form and type of surface change involved that affecting the surface integrity of the product.

(3 marks)

(ii) Criticize the manufacturing process of your answer in **Q2(b)(i)**.

(2 marks)

(iii) By using an appropriate diagram, recommend the manufacturing process of the square metal tube to decrease from large radius to a small radius as **Figure Q2(b)(iii)**.

(4 marks)

Q3 (a) Based on **Figure Q3(a),** recommend the manufacturing process and category of mold processes with supporting points.

(4 marks)

(b) In casting experiments performed using a certain alloy and type of sand mold, it took 155 sec for a cube-shaped casting to solidify. The cube was 50 mm on a side. Determine the value of the mold constant in Chvorinov's rule.

(6 marks)

(c) For every sand casting defects, recommend a suitable approach to minimize and eliminate the defect.

(4 marks)

(d) The technique of blow molding is used to produce mineral water bottle as illustrated in **Figure Q3(d)**. With the aid of a diagram, construct the working operation of blow molding of mineral water bottle.

(6 marks)

Q4 (a) During the interview session for product designer position with Managing Director of Honda Manufacturing, he asked you a question about the general considerations that product designers must keep in mind when designing components out of plastics. Point out your ideas.

(4 marks)

(b) The foreman in the injection molding department says that a PVC part produced in one of the operations has greater shrinkage than the calculations indicate it should have. The important dimension of the part is specified as 85.6 ±0.43 mm. However, the actual molded part measures 86.05 mm.

(i) Suggest a new material which can be produced within the required tolerance to replace PVC by referring to **Table Q4(b)(i)**.

(4 marks)

(ii) If the company decided to fix with the PVC, list **TWO (2)** adjustments in process parameters that could be made to reduce the amount of shrinkage.

(4 marks)

(c) During the proposal presentation for new product of your company, one of the stakeholders asked about metal forming which is the general process for the metal screw production. He asked about the importance of lubricant during the metal forming process especially in the metal screw production. Point out your ideas.

(8 marks)

Q5 (a) In a turning operation on stainless steel with hardness = 200 HB, the cutting speed = 200 m/min, feed = 0.25 mm/rev, and depth of cut = 7.5 mm. The energy value, F_c = 2.8 Nm/mm^3.

(i) Determine the metal removal rate.

(2 marks)

(ii) Calculate the power drew by the lathe in performing this operation if it's mechanical efficiency = 90%.

(3 marks)

(Hint: $R_{MR} = vfd$*)*

(b) As a project engineer, you are required to propose an enhance machining system in the factory. The proposal should discuss how to avoid chatter (vibration) during the turning operation. Point out your idea.

(4 marks)

(c) A 4.6 kW heat source transfers heat to the surface of a metal part. The heat affects the surface in a circular area, with intensities varying inside the circle.

(i) Calculate the percentage of power transferred within a circle of diameter, d = 6 mm when the power density in this region is 97.63 W/mm^2.

(3 marks)

(ii) Calculate the percentage of power transferred within a concentric circle of diameter, d = 10 mm when the power density in this region is 18.30 W/mm^2.

(3 marks)

(d) Modern inspection technologies include contact and non-contact sensing devices.

(i) List **THREE (3)** example of modern inspection devices.

(3 marks)

(ii) Explain **TWO (2)** of the devices.

(2 marks)

-END OF QUESTIONS –

FINAL EXAMINATION

SEMESTER / SESSION : SEM II 2020/2021
COURSE NAME : MANUFACTURING PROCESS
PROGRAMME CODE: BEJ
COURSE CODE : BEH 41303

Figure Q2(a) Level transmitter with customized flange.

Figure Q2(b) Square metal tube in an office chair.

FINAL EXAMINATION

SEMESTER / SESSION : SEM II 2020/2021
COURSE NAME : MANUFACTURING PROCESS
PROGRAMME CODE: BEJ
COURSE CODE : BEH 41303

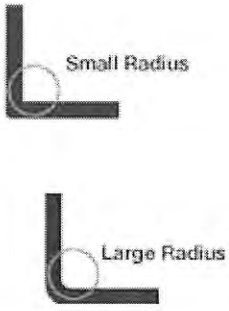

Figure Q2(b)(iii) Small and large radius.

Figure Q3(a)

FINAL EXAMINATION

SEMESTER / SESSION : SEM II 2020/2021
COURSE NAME : MANUFACTURING PROCESS
PROGRAMME CODE: BEJ
COURSE CODE : BEH 41303

Figure Q3(d)

TABLE Q4(b)(i): Typical Values of Shrinkage for Moldings of Selected Thermoplastics.

Plastic	Shrinkage, mm/mm (in/in)
ABS	0.006
Nylon-6,6	0.020
Polycarbonate	0.007
Polyethylene	0.025
Polystyrene	0.004
PVC	0.005