UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	MANUFACTURING PROCESS
COURSE CODE	:	BEH 41303
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	JULY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS **OPEN BOOK EXAMINATION**

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

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

(6 marks)

(b) Referring to the technical and physical limitations of a manufacturing firm and its individual plant, there are three dimensions of manufacturing capability: technological processing capability, physical product limitations and production capacity. Explain these limitations.

(3 marks)

(c) Final products made by the manufacturing industries can be divided into two major classes which are consumer and capital goods. Explain and give examples of these classes.

(4 marks)

(d) Plastic or polymer plays an important role in our daily life. Differentiate between a thermoplastic polymer and a thermosetting polymer.

(7 marks)

Q2 (a) As a design engineer in Gorilla Glass Corporation, your task is to design a new generation of glass which will be used in smart phones. In the specification report of your new glass product, you are supposed to include measuring gauge used to determine the surface roughness of the glass. Explain your answer by including the gauge used and the process.

(4 marks)

(b) A tensile test uses a test specimen that has a gauge length of 60mm and an area of 240mm^2. During the test the specimen yields under a load of 98,000N and the corresponding gauge length is measured at 60.23mm. The maximum load of 168,000N is reached at a gauge length of 64.2mm.

(i) Calculate the yield strength.

(3 marks)

(ii) Calculate the modulus of elasticity, E.

(6 marks)

(iii) If fracture occurs at a gauge length of 67.3mm, calculate the percentage of elongation.

(3 marks)

(c) A 3000W 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. The distribution is as follow: 70% of the power is transferred within a circle of diameter, d = 5mm, 90% is transferred within a concentric circle of diameter, d = 12mm.

Calculate the power densities in:

(i) The 5mm diameter, *d* inner circle.

(2 marks)

(ii) The 12mm diameter, *d* ring that lies around the inner circle.

(2 marks)

Q3 (a) In the casting of steel under certain mold conditions, the mold constant in Chvorinov's rule is known to be 4.0 min/cm^2, based on previous experience. The casting is a flat plate whose length = 30 cm, width = 10 cm, and thickness = 20 mm. Determine how long it will take for the casting to solidify.

(7 marks)

(b) In a plastic extruder system, the diameter of an extruder barrel is 65mm and its length=1.75m. The screw rotates at 55rev/min. The screw channel depth = 5.0mm, and the flight angle – 18°. The head pressure at the die end of the barrel is 5.0×10^6Pa. The viscosity of the polymer melt is given as 100Pa-s. Find the volume flow rate of the plastic in the barrel.
Hint:
apply formula

$$Q_x = 0.5\pi^2 D^2 N d_c \sin A \cos A - \frac{p\pi D d_c^3 \sin^2 A}{12\eta L}$$

(6 marks)

(c) The technique of thermal forming is used to produce food trays as illustrated in **Figure Q3(c)**. With the aid of a diagram, illustrate the working operation of thermal forming food trays.

(7 marks)

Q4 (a) Differentiate between bulk deformation and sheet metalworking.

(6 marks)

(b) One of the important things in metal forming process is the lubrication.

(i) Explain metal friction in metal forming

(3 marks)

(ii) Explain the importance of lubricants in metal forming

(4 marks)

(iii) Describe the factors that affect lubricant selection.

(4 marks)

(c) In a turning operation on stainless steel with hardness = 175 HB, the cutting speed = 175 m/min, feed = 0.15 mm/rev, and depth of cut = 7.5 mm. The energy value, F_c = 2.35 Nm/mm^3. Determine the metal removal rate.

(3 marks)

-END OF QUESTIONS –

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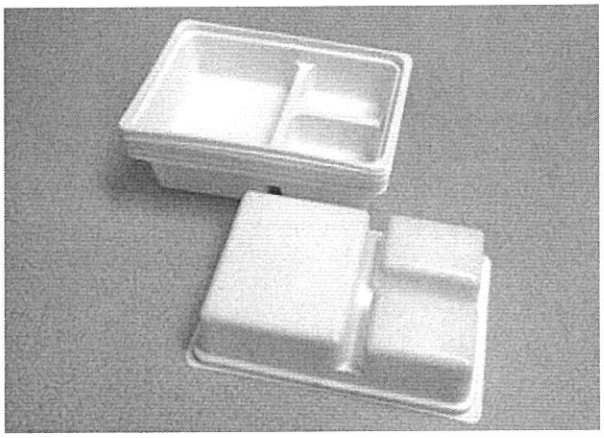

Figure Q3(c)