Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	MANUFACTURING PROCESS
COURSE CODE	:	BEH 41303
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	DECEMBER 2016/ JANUARY 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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

Q1 (a) Manufacturing industries can be classified as 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. Summarize 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) As engineering materials, it is appropriate to divide polymers into three categories which are thermoplastic, thermosetting and elastomers. Differentiate between thermoplastic polymer and 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. Justify your answer by including the gauge used and the process.

(6 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)

(iv) Draw and highlight properly the stress-strain curve of the specimen.

(2 marks)

Q3 (a) To date, plastic or polymer products exist in everyday life. Explain the relationship of viscosity and temperature of plastic with referring to **Figure Q3(a)**.

(2 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, construct the working operation of thermal forming food trays.

(6 marks)

(d) Supposed that you are the production engineer and is about to kick-start the production of a plastic product: an industrial plastic pallet of size 4m x 7m. Propose the design issues and considerations for plastic forming in the aspect of material properties, extrusions and molding.

(6 marks)

Q4 (a) As a technopreneur, you would like to venture into the production of metal screws which fall under bulk deformation process. However, in order to get the funding from the stakeholders, you need to reassure them on the investment.

(i) In order for the stakeholders to approve the project, you are required to write a proposal regarding the production. The proposal should consist of the difference between bulk deformation and sheet metalworking. The proposal should also include the metal screw process by including related figures.

(12 marks)

(ii) During the proposal presentation, 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) As a project engineer in Cycle Bike Sdn. Bhd., a bicycle production factory, you are required to propose a new machining system in the factory. The system consists of metal machining and lathe machining.

(i) In order for the management to approve the expansion project, you are required to write a proposal regarding the expansion project. The proposal should consist of the importance and operation of machining in industries, together with the propose lathe machine general structure and its operation.

(8 marks)

(ii) Describe three types of inspection and measurement devices. Choose two factors and their related types of inspection and measurement devices. Justify your choices.

(8 marks)

(b) 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)

-END OF QUESTIONS –

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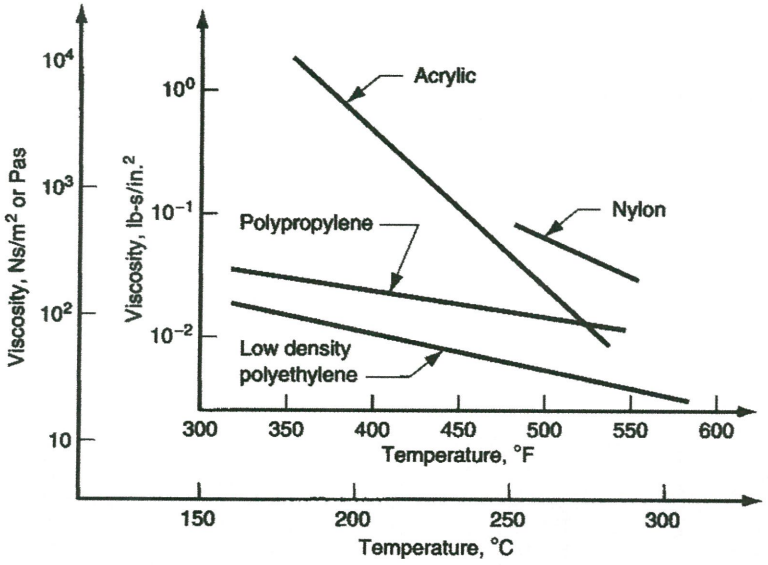

Figure Q3 (a)

Figure Q3 (c)