Centre for Polymer Science & Engineering

PTL702: POLYMER PROCESSING

Major Test (02.05.2008)

Time : **2 Hour** Total marks : **50**

Q.1. Consider fabrication of a deep drawn product (200 mm deep X 50 mm diameter) :

a. Compare and analyse thermoforming, rotomolding and injection molding processes for making the product.

b. What technical and economic considerations should be considered in determining which method is best?

(8 marks)

Q.2. Compare and contrast the following (any three):

a) Characteristics and performance of single screw vs. twin screw extrusion

b) Features and advantages of injection blow vs. extrusion blow moulding

c) Output and economy of sheet casting vs. film blowing process

d) Part thickness variation in thermoforming for male vs. female mould.

(9 marks)

Q.3. Discuss the following (any three):

a) Packing the mold and it's importance in obtaining good injection molded parts.

b) The effect of molecular weight distribution in extrusion process.

c) Importance of blow-up ratio and its relation to rheological characteristics.

d) Criticality of raw material specification in rotomoulding process.

(9 marks)

Q.4. a) Describe the moulding cycles for fabrication of the following articles:

i) car bumper and ii) overhead tank

b) State the usefulness of selecting proper

i) runner design and ii) gate locations.

(8 marks)

Q.5. a) Define WATS and state its significance.

b) List and discuss compounding processes for making masterbatches.

c) Discuss the methods to assess degree of mixing.

(6 marks)

Q.6. For an extruder operation with LDPE (2MFI, ρ= 1.00) the machine specification and processing conditions are as follows :

Machine Specification	**Operating Conditions**		
Diameter : 100 mm	Speed (rps)	5.0	
Channel depth : 5 mm	ϕ	0.5	
Pitch : 100mm	T_P(°C)	150	250
Flight width :10mm	μ (N.s.m^{-2})	3000	1000
Clearance : 0.1 mm			

a) Calculate i) maximum mass flow rate and ii) maximum pressure drop

b) Determine change in power requirement for change of process temperature from 150°C to 250°C.

(10 marks)