

National Examinations December 2018
17-Ind-B2-Manufacturing Processes
3 hours duration

Notes:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a Closed Book exam. Candidates may use one of two calculators, the Casio or Sharp approved models.
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
4. All questions are of equal value.
5. Write your answers in point-form whenever possible, but fully. Show all calculations. Please note that deduction will be made for any irrelevant issues that you included in your answer. So please be concise.

Marking Scheme (marks)

1. (a) 2 (b) 2 (c) 2 (d) 2 (e) 2 (f) 2 (g) 2 (h) 2 (i) 2 (j) 2
2. (a) 6.5 (b) 6.5 (c) 7
3. (a) 10 (b) 10
4. (a) 20
5. (a) 20
6. (a) 20
7. (a) 20

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1. Write N for net-shaping technology, A for additive technology and C for cutting technology.

a. Sand casting;	b. Plastic extrusion;	c. Stamping;	d. Rolling;	e. Lathe;
f. Welding;	g. Milling;	h. 3D printing	i. Bending;	j. Injection molding.
2. (a) What are the typical post-manufacturing technologies for casting?
(b) Name two functions of the “riser” in sand casting.
(c) Name two casting technologies that use an expendable mold.
3. (a) Describe why parts made from investment casting do have much less cracks and porosities compared to other casting technologies.
(b) Briefly describe why the die cast parts are very weak.
4. Describe all the pros and cons (advantages and disadvantages) involved in increasing the thickness of injection molded parts. You had better write as many points as possible which are not incorrect. But if you include irrelevant issues, there will be significant deduction. Focus on the cost and performance (quality) of the products.
5. Describe why higher residual stresses are developed in the injection molded parts when a lower mold temperature is used?
6. Machining and forming are two common processes to produce metal parts. Compare these two types of manufacturing processes for metal in the context of product geometry, mechanical properties, and economics in mass-production versus small-batch production environments.
7. What is the recommended process to manufacture a (hollow) aluminum elbow pipe.