

National Examinations December 2012
98-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 the calculations.

Marking Scheme (marks)

1.	(i) 7,	(ii) 7,	(iii) 6
2.	(i) 8,	(ii) 7,	(iii) 5
3.	(i) 8,	(ii) 5,	(iii) 7
4.	(i) 7,	(ii) 7,	(iii) 6
5.	(i) 7,	(ii) 6,	(iii) 7
6.	(i) 8,	(ii) 7,	(iii) 5
7.	(i) 8,	(ii) 7,	(iii) 5

Front Page

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1. (i) State the specific characteristics of non-ferrous alloys in general and aluminum, magnesium and copper alloys in particular.
(ii) What are the basic advantages of plastics in comparison to metals? State the general characteristics of plastics.
(iii) Explain the current trends that are taking place in the development, use and improvements in plastics.
2. (i) State the important factors that must be considered in casting operations. Explain the reasons for using casting processes over other manufacturing methods.
(ii) What is a shell molding process? State the advantages and disadvantages of this process.
(iii) What are the advantages and limitations of permanent molds casting processes (die, centrifugal, etc.)?
3. (i) A 6 in. long, $\frac{1}{2}$ in. diameter 304 stainless steel rod is being reduced in diameter to 0.480 in. by turning on a lathe. The spindle rotated at 400 rpm, and the tool is traveling at an axial speed of 8 in./min. Calculate the cutting speed and the material removal rate.
(ii) Explain the different types of metal chips and which one of them is the best?
(iii) What is a built-up edge and how it affects metal cutting operation? How can it be eliminated or minimized?
4. (i) State the general characteristics of the following forming and shaping processes: (a) forging, (b) extrusion, and (c) sheet-metal forming.
(ii) What are the steps followed in a typical forging operation?
(iii) What are the current trends in forging design and manufacturing?
5. (i) State the characteristics of grinding operations and machines.
(ii) State the specific design considerations that should be given to grinding operations.
(iii) Discuss the economics of grinding and finishing operations in the context of surface finish and dimensional accuracy.
6. (i) Explain the shielded metal-arc welding process, using a schematic illustration.
(ii) State the characteristics of the gas metal-arc welding process. What are the special advantages of this welding process?
(iii) What factors are considered for the selection of a particular welding process?
7. (i) State the advantages and limitations of numerically controlled (NC) machines over conventional machines.
(ii) State the characteristics of direct numerical control (DNC) and computer numerical control (CNC) machines.
(iii) State the advantages of CNC over conventional NC (DNC) machines.