

National Examinations December 2010
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) 7,	(ii) 6,	(iii) 7
4.	(i) 7,	(ii) 7,	(iii) 6
5.	(i) 8,	(ii) 5,	(iii) 7
6.	(i) 8,	(ii) 7,	(iii) 5
7.	(i) 6,	(ii) 8,	(iii) 6

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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) State the general characteristics of the following forming and shaping processes: (a) forging, (b) extrusion, and (3) sheet-metal forming.
(ii) What steps are followed in a typical forging operation?
(iii) State the advantages and limitations of open die and closed die forging processes.
4. (i) Explain briefly the factors or parameters that influence the metal cutting processes.
(ii) Briefly state your understanding of: (a) tool wear and failure, (b) surface finish and integrity and (c) machinability.
(iii) What are the current trends in metal cutting processes?
5. (i) It is required to drill a 2½" diameter hole, through a 4½" thick, soft cast iron machine part, with high speed drill bit. The following data are obtained from the machinist handbook:
Drill bit point angle = 118°
Drill speed, for soft cast iron (with high speed drill) = 240 rpm
Drill feed (for 1" diameter and over drills) = 0.25 rpm/rev.
Determine the cutting time (min.) for the drill press operation.
(ii) Explain the basic cutting-fluid action in metal working operations.
(iii) Explain the effects of cutting fluids in a machining operation with particular reference to workpiece material, machine tools and biological and external environment.
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 application of numerical control on all aspects of manufacturing operations.
(ii) What are the advantages and limitations of numerically controlled machines compared to the conventional machines?
(iii) Explain the role of sensors in technologies other than manufacturing.