

**National Examinations May 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) 7,	(ii) 6,	(iii) 7
3.	(i) 7,	(ii) 6,	(iii) 7
4.	(i) 7,	(ii) 7,	(iii) 6
5.	(i) 8,	(ii) 5,	(iii) 7
6.	(i) 7,	(ii) 7,	(iii) 6
7.	(i) 6,	(ii) 8,	(iii) 6

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1. (i) Explain the major responsibilities of manufacturing engineers in the manufacture of a product. How do they cooperate with industrial engineering when plant floor activities are concerned?  
(ii) What are the factors considered in the selection of engineering materials for manufacturing?  
(iii) State your understanding of the annealing process. What is the purpose of the annealing process?
2. (i) State the basic advantages of plastics in comparison to metals. What are the general characteristics of plastics?  
(ii) Why are additives compounded with polymers/plastics? Name the typical additives generally used.  
(iii) Explain the specific characteristics of: (1) thermoplastics, (2) thermosets and (3) elastomers/rubbers.
3. (i) What is a die casting process? Explain the difference between hot-chamber and cold-chamber processes.  
(ii) What are the advantages and disadvantages of die casting?  
(iii) What is an investment casting process? What parts are generally cast by this process?
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) What is residual stress in a welding process? What are the detrimental effects of residual stresses?  
(ii) What factors must be considered in the selection of a joint and a welding process?  
(iii) State the future trends in welding technology.

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.