

National Examinations May 2016
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 calculations.

Marking Scheme (marks)

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|----|--------|---------|---------|
| 1. | (i) 7, | (ii) 7, | (iii) 6 |
| 2. | (i) 7, | (ii) 6, | (iii) 7 |
| 3. | (i) 8, | (ii) 5, | (iii) 7 |
| 4. | (i) 7, | (ii) 7, | (iii) 6 |
| 5. | (i) 8, | (ii) 6, | (iii) 6 |
| 6. | (i) 8, | (ii) 6, | (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) 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 in./rev.
Determine the cutting time (min.) for the drill press operations.
(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 work piece material, machine tools and biological and external environment.
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) Explain the resistance welding processes and the main advantages. State the general expression (equation) for the heat generated in resistance welding.
(ii) What is the difference between resistance spot welding and resistance seam welding processes? State their advantages.
(iii) What is oxyfuel gas cutting? Explain its process capabilities.
6. (i) What is the basic difference between the two groups of plastics? State the characteristics of each group of plastics.
(ii) Explain the purpose of employing specific additives in polymers.
(iii) Explain the manner by which the various factors affect the general properties of plastics.
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.