FINAL
Examination Paper

(COVER PAGE)

Session : January 2008

Programme : Diploma in Mechatronics Engineering

Course : EGM265: Manufacturing Processes & Automation

Date of Examination : April 19, 2008

Time : 11.00 am – 1.00 pm Reading Time : Nil

Duration : 2 Hours

Special Instructions :

This paper consists of SIX (6) questions. Answer any FOUR (4) question in the answer booklet provided. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s) : Sami Salama Hussen Hajjaj

Moderator : Prof Dr Shamsuddin bin Sulaiman

This paper consists of 4 printed pages, including the cover page.
This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All question carry equal marks.

**Question 1**

(a) What is the difference between the design process and Manufacturing process? And how are they related?  
(5 marks)

(b) Explain the meaning and the importance of DFX in Manufacturing Engineering.  
(10 marks)

(c) You were handed a design by your manager, and were assigned to select the best suitable material for this design. What factors would you consider in your selection process? why?  
(10 marks)

**Question 2**

(a) A material has been selected for the design you were handed by your manager, this material can processed to shape using any of the following processes: casting, machining, or welding. What factors would you consider in your selection process? Why?  
(10 marks)

(b) You already know the physical, chemical, and mechanical properties of material X. is this information enough for you to select the best suitable manufacturing process? Why? Give an example.  
(10 Marks)

(c) Which decision should come first, selecting material or selecting process? Or are they inter-related? Give an example.  
(5 marks)
Question 3

(a) Material cutting processes can control by controlling it variables. List and discuss five (5) independent variables.  

(5 marks)

(b) Tool wear is a major factor in material cutting, explain the following related terms (use sketches if needed):

(i) Tool wear  
(ii) Tool wear limit  
(iii) Tool life  
(iv) The ISO limit  
(v) Tool wear rate  

(10 marks)

(c) There are wide variety of material cutting operations, each with its special features and applications. List and discuss five (5) reasons why do we need material cutting operations  

(10 marks)

Question 4

(a) Welding operations, just like other joining operations, have their advantages over other processes. However, welding operations have their own disadvantages. List and discuss five (5) disadvantages of welding operations.  

(5 marks)

(b) Briefly explain the working principle of the following joining operations (use sketches if needed):

(i) Shielded arc welding  
(ii) EBM welding  
(iii) Friction welding  
(iv) Torch Brazing  
(v) Metal stitching  

(10 marks)

(c) Designing for welding is an important component of DFM, list and discuss five (5) design guidelines for Design for Welding  

(10 marks)
Question 5

(a) Forging consist of family of operations, each with its unique applications and needs, briefly explain the working principles of FIVE (5) forging operations (5 marks)

(b) From the planning point of view, each of the bulk deformation processes below possesses unique characteristics, discuss characteristics of each:

(i) Forging
(ii) Rolling (flat)
(iii) Extrusion
(iv) Drawing
(v) Swaging

(15 marks)

(c) Bulk deformation methods have their advantages and disadvantages over other processes. Discuss and explain. (5 marks)

Question 6

(a) Casting operations are some important operations in Manufacturing engineering. Discuss the importance of the following terms to casting:

(i) Solidification
(ii) Heat transfer
(iii) Cooling rate
(iv) Fluid flow
(v) Shrinkage

(5 marks)

(b) There many major types of casting operations, briefly explain the working principle of the following casting operations:

(i) Sand casting
(ii) Evaporative-pattern casting
(iii) Die casting
(iv) Injection mould casting
(v) Centrifugal casting

(10 marks)

(c) One of the crucial aspects of casting design is designing the location, size of the Riser. Discuss FIVE (5) rules of riser design rules. (10 marks)

- THE END -

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