THE OPEN UNIVERSITY OF SRI LANKA

FACULTY OF ENGINEERING TECHNOLOGY

BACHELOR OF TECHNOLOGY – LEVEL 06

FINAL EXAMINATION – 2007

034

MEX6334 – ADVANCED MANUFACTURING TECHNOLOGY

DATE : ***APRIL 22, 2008***

TIME : ***0930 HRS. – 1230 HRS***

DURATION : ***THREE HOURS***

PLEASE READ THE FOLLOWING INSTRUCTIONS BEFORE ANSWERING THE PAPER

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INSTRUCTIONS:

1. *This paper is of closed book type.*
2. *This paper consists of eight questions.*
3. *You are required to answer any **five questions only**.*
4. *Answers should be written on the answer books provided by the Examinations Division.*

Question 01

(1.1) Briefly explain the role of computers in manufacturing industry. *(06 marks)*

(1.2) What are the potential benefits which can be achieved by integrating computers in manufacturing? *(06 marks)*

(1.3) Elaborate on the statement *The concept of economies of scale has been replaced by the notion of economies of scope* with regard to manufacturing industries. *(08 marks)*

Question 02

(2.1) Define the term Computer Integrated Manufacturing (CIM) and explain the nature of such a system. *(08 marks)*

(2.2) Explain the various levels of integration of CIM within a manufacturing industry. *(05 marks)*

(Cont...)

(2.3) Why is it often considered a difficult task in justifying the investment in using CIM technology, especially using traditional investment appraisal methods?

(07 marks)

Question 03

(3.1) Explain the concept of a Flexible Manufacturing System (FMS) and identify at least 5 flexibilities found within the context of FMS. *(08 marks)*

(3.2) What are the criteria that needs to be satisfied, if a manufacturing system is to be considered as flexible? *(05 marks)*

(3.3) Briefly discuss the pros and cons of implementation of FMS with regard to manufacturing industries. *(07 marks)*

Question 04

(4.1) Define the acronyms CAD and CAM and list out the basic elements/components in each of these systems. *(08 marks)*

(4.2) Discuss the benefits that can be achieved when CAD and CAM technologies are integrated in manufacturing industry. *(06 marks)*

(4.3) *FEA applications have become a vital component in CAD environment.* Elaborate on the above statement. *(06marks)*

Question 05

(5.1) Explain with the aid of suitable examples, the representation schemes (at least 4) used in 3D solid modeling techniques. *(08 marks)*

(5.2) Briefly explain the levels of graphics standards communication in relation to a CAD/CAM system and state the importance of having such standards. *(07 marks)*

(5.3) What are the typical applications of user-generated software in CAD systems?

(05marks)

(Cont...)

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Question 06

(6.1) Define the term Computer Numerical Control (CNC) and explain why this technology has gain popularity in modern manufacturing industry. *(07 marks)*

(6.2) *One of the key factors influencing the accuracy of CNC machining are the static and dynamic loading acting on the machine.* Explain how these loading conditions have been eliminated or minimized in designing CNC machine tool structure. *(07 marks)*

(6.3) Explain the concept of tool length offset as applied to CNC machine tool controllers. *(06marks)*

Question 07

(7.1) *Functions performed by Direct Numerical Control (DNC) system are unique and could not be accomplished either with conventional NC or with CNC systems.* Briefly explain these functions performed by DNC. *(06 marks)*

(7.2) Explain why combined DNC/CNC systems are superior to those of DNC systems. *(06 marks)*

(7.3) *Adaptive control is most appropriate where variability of machining is prominent.* What are the sources of machining variability and briefly explain the approaches taken by adaptive control methods in order to eliminate or minimize these errors? *(08 marks)*

Question 08

(8.1) Industrial robots share many attributes in common with a NC machine tool. What are the features that distinguish an industrial robot from a conventional NC or CNC machine tool? *(07 marks)*

(8.2) Distinguish between a "Gantry" type industrial robot and a "SCARA" type industrial robot. Explain the suitability of such robots for material handling operations. *(07 marks)*

(8.3) Discuss the major application areas of industrial robots. *(06 marks)*

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