THE OPEN UNIVERSITY OF SRI LANKA

FACULTY OF ENGINEERING TECHNOLOGY

BACHELOR OF TECHNOLOGY – LEVEL 06

FINAL EXAMINATION – 2008/2009

MEX6334 – ADVANCED MANUFACTURING TECHNOLOGY

037

DATE : ***MARCH 15, 2009***

TIME : ***0930 HRS. – 1230 HRS***

DURATION : ***THREE HOURS***

PLEASE READ THE FOLLOWING INSTRUCTIONS BEFORE ANSWERING THE PAPER

INSTRUCTIONS:

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

Question 01

(1.1) What are the different stages of development in manufacturing automation systems? Draw examples to illustrate your answer.

(1.2) Distinguish clearly between soft automation and hard automation and discuss the applicability of each in manufacturing industries.

(1.3) Briefly discuss the main types of manufacturing industries and the use of computer integration in the above mentioned industries.

Question 02

(2.1) Discuss at least (05) five benefits that can be achieved by using Computer Integrated Manufacturing (CIM) in manufacturing industries. Justify your answer.

(2.2) Automatic warehousing plays a vital role in CIM systems. Discuss the benefits of using such a system over the conventional warehousing system.

(2.3) Discuss the different levels of integration of CIM in an enterprise.

Question 03

(3.1) Not all fully automated manufacturing systems and cells can be called Flexible Manufacturing Systems/Cells (FMS/FMC)." Comment on this statement drawing examples for such systems.

(3.2) Discuss the criterion that has to be satisfied in order for a manufacturing system to be considered as flexible.

(3.3) List out the benefits of employing a FMS in a manufacturing industry.

Question 04

(4.1) What is a "turnkey system"? In some cases turnkey systems may not be the best for a CAD situation" Explain.

(4.2) Explain how different CAD/CAM systems communicate with each other. List out all the components / elements in these systems.

(4.3) Distinguish between vector refresh display and raster refresh display, stating the advantages and disadvantages of each of them.

Question 05

(5.1) Distinguish between Numerical Control (NC) and Computer Numerical Control (CNC) machine tools and describe the factors you would consider in justifying the economic benefits in implementing NC/CNC machine tools for an industry.

(5.2) Explain what is meant by Hybrid CNC and Straight CNC. What lead to the development of such systems?

(5.3) Explain briefly the main functions of a Direct Numerical Control (DNC) system.

Question 06

(6.1) Explain "Adaptive Control (AC)" in the context of machine tool control.

(6.2) Adaptive Control (AC) can be successfully employed to control machine tools when sources of variability are high. Discuss these sources of variability.

(6.3) Explain the approaches commonly used in adaptive control (AC) in controlling machine tools.

Question 07

(7.1) Describe the primary difference between a geometry represented by a solid model and a surface model.

(7.2) What are the two most commonly used techniques for creating a solid model? Explain.

(7.3) The models created by using solid modeling are often used in Finite Element Analysis FEA applications and has become a powerful tool in modern CAD/CAM environment. However, FEA applications have given rise to number of associated problems causing some concern. List at least (05) five such problems associated with FEA.

Question 08

(8.1) Explain the basic types of robot configurations, commonly used in manufacturing industries. What type of configuration is best suited for a pick and place task such as picking up of bottles from a conveyer belt?. Justify your answer.

(8.2) "For a given control memory capacity of a robot, larger robot would have a poor special resolution than a smaller robot." Elaborate on the statement by taking a suitable example.

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