THE OPENUNIVERSITY OF SRI LANKA

FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF TECHNOLOGY – LEVEL 06
FINAL EXAMINATION – 2011

MEX6334 – ADVANCED MANUFACTURINGTECHNOLOGY

DATE : ***MARCH 06, 2012***

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.*
4. *Commence to answer each new question on a **fresh page.***

Question 01

(1.1) Briefly explain the concept of Computer Integrated Manufacturing (CIM) as applied in modern manufacturing industries.

(1.2) *Before implementing CIM in a particular manufacturing enterprise, an intensive investigation into the enterprise's manufacturing activities is essential.* Why is this so?

(1.3) Discuss at least four (04) potential benefits that can be derived from successfully implementing CIM in an organization.

Question 02

(2.1) List the types of manufacturing industries and discuss the applicability of computer integration within these industries.

(2.2) Discuss the evolutionary stages of automation. Elaborate each stage by taking suitable examples.

(2.3) Elaborate on the direct and indirect application of computer technology in a manufacturing enterprise.

Question 03

(3.1) Define the acronyms CAD, CAM and CAD/CAM. List the basic elements/components in each of these systems.

(3.2) Discuss the benefits that can be derived when CAD and CAM technologies are integrated into the manufacturing industry.

(3.3) Explain how different CAD/CAM systems communicate among each other.

Question 04

(4.1) Distinguish a Flexible Manufacturing Cell (FMC) from a Flexible Manufacturing System (FMS).

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

(4.3) Explain different approaches considered in optimizing the overall efficiency and effectiveness of a FMS.

Question 05

(5.1) Using an appropriate flow chart, discuss the difference between the conventional design process and Computer Aided Design (CAD) process.

(5.2) List out major functions that needs to be performed by the user with input devices in a CAD workstation. Briefly describe the devices available for performing such tasks.

(5.3) Compare and contrast vector refresh displays and raster refresh displays as used in CAD systems. Elaborate by taking advantages and disadvantages for each of the two display systems.

Question 06

(6.1) State the general characteristics of products to be manufactured using Numerical Control (NC) machines and list out the potential application areas of NC technology.

(6.2) Illustrate, with simple block diagrams, the difference in the application of open-loop and closed-loop control for NC and Computer Numerical Control (CNC) machine tools.

(6.3) In modern industry, even high-volume production equipment that are normally associated with hard (fixed) automation is controlled by computers and computer software. Elaborate on such systems taking into account the advantages that it has to offer in the context of modern day factory environment.

Question 07

(7.1) Explain the concept of *Adoptive Control (AC)* in the context of machine tool control.

(7.2) *Even though AC is a powerful and flexible control methodology, it may not suit every machining situations*. What are the appropriate conditions where AC can be successfully applied with regard to machining operations? Discuss at least three (03) such conditions.

(7.3) What are the potential benefits that can be derived when AC is appropriately employed in CNC machining?

Question 08

(8.1) Distinguish a "Gantry" type robot from a "SCARA" type robot. Explain the suitability of such robots for material handling operations.

(8.2) What are the technical features that are to be taken into consideration when selecting a robot for a particular application? Elaborate by taking a suitable example.

(8.3) Explain the terms, "Serviceability", "Modularity" and "Dexterity" in the context of an Industrial Robot.

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