



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2010/2011**

**COURSE NAME : AUTOMATION SYSTEM AND
ROBOTICS**

COURSE CODE : DEK 3223

PROGRAMME : 3 DEE /DET / DEX

EXAMINATION DATE : NOVEMBER/DECEMBER 2010

DURATION : 2 1/2 HOURS

**INSTRUCTIONS : ANSWER FIVE (5) QUESTIONS
ONLY**

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

Q1 (a) State the “Laws of Robotics”
(4 marks)

(b) Explain each of the terminology below;

- (i) Safeguards**
- (ii) Guards/ Barriers Guards**
- (iii) Personal Protective Equipment**

(6 marks)

(c) Presence-Sensing Devices is a type of safeguards. Give two (2) examples of these devices and describe the functionality for each of them.

(10 marks)

Q2 (a) By referring to Figure Q2(a);

- (i) Sketch the work envelope.**
- (ii) Sketch the swing view.**
- (iii) Number of Linear Extensional Rotational Twisting (LERT) for this robot.**
- (iv) Number of Degree of Freedom (DOF).**

(8 marks)

(b) Compare the difference between cylindrical and spherical robot based on the following characteristics:

- (i) Axes motion**
- (ii) The work envelope from swing view**
- (iii) The ability to reach around obstacle**

(12 marks)

- Q3**
- (a) Illustrate a simple pneumatic circuit.
(4 marks)
 - (b) List types of motion for a robot manipulator.
(4 marks)
 - (c) From the Q3(b), describe two (2) types of a robot manipulator's motion.
(6 marks)
 - (d) Define the intelligent control robot.
(6 marks)
- Q4**
- (a) Compare all the three (3) types of automation.
(6 marks)
 - (b) The concept of automated system can be applied to various levels of factory operation.
 - (i) Locate five (5) hierarchy level of automation.
 - (ii) Briefly, describe each of them.
 - (iii) Give example for each level of automation.(14 marks)
- Q5**
- (a) Illustrate the basic architecture of Programmable Logic Controller (PLC).
(5 marks)
 - (b) Discuss the advantage of Programmable Logic Controller (PLC) over conventional relays, timer, counter and other hardware elements.
(5 marks)
 - (c) Pneumatic systems used in range from the powering of hand tools to the lifting and clamping of products during machining operations. Explain the operation of pneumatic system with an aid of a diagram.
(10 marks)

- Q6**
- (a) Define numerical control.

(5 marks)
 - (b) List the component of operational numerical control systems.

(3 marks)
 - (c) From Q6(b), describe the function of each components.

(6 marks)
 - (d) Numerical control (NC) technology has been applied to a wide variety of operations. Illustrate two (2) kinds of application that used NC technology.

(6 marks)
- Q7**
- (a) Computer Integrated Manufacturing (CIM) system is divided into five (5) levels. Briefly, define all of them.

(10 marks)
 - (b) There are several basic components of a Flexible Manufacturing System (FMS).
 - (i) Describe the entire basic component of an FMS.
 - (ii) Illustrate the FMS components.

(10 marks)

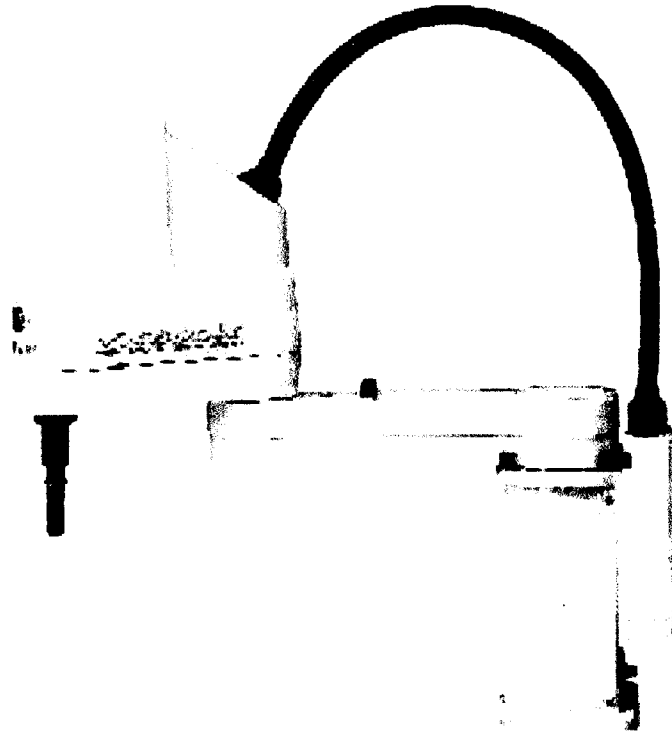
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Figure Q2(a)